

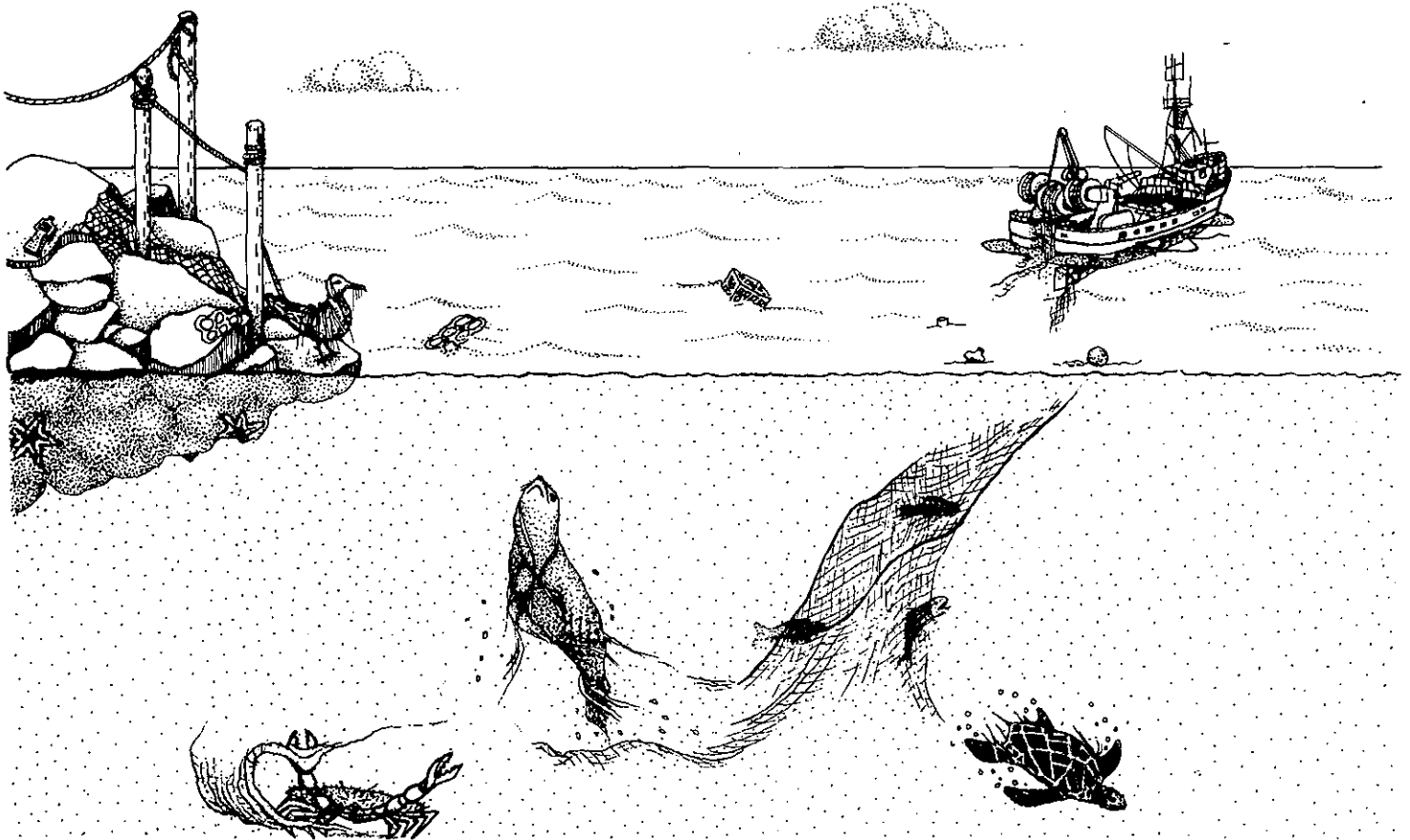
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DEALING WITH ANNEX V - REFERENCE GUIDE FOR PORTS

Fran Recht



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U.S. DEPARTMENT OF COMMERCE
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National Marine Fisheries Service

DEALING WITH ANNEX V — REFERENCE GUIDE FOR PORTS

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Marine Entanglement Research Program
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This guide is dedicated to the fishermen of Newport, Oregon, and to port harbormaster Bud Shoemake and crew, who created a remarkable model.

The author wishes to acknowledge the help and support given the project by the Port of Newport, the members of the Marine Refuse Disposal Project Advisory Group, the Oregon State University Extension/Sea Grant Program, the Marine Entanglement Research Program, the Oregon State University Marine Resources Management Program, and my friends.

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Jim Coe's editing and suggestions have much improved this guide.

PREFACE

This reference guide has been assembled based on experiences gained in Newport, Oregon, during a 15 month pilot project. The project improved refuse reception facilities at the Port of Newport and encouraged the return of refuse to port through an educational campaign. The Port of Newport serves a large and diversified commercial fishing fleet, numerous recreational vessels, and operates a small non-containerized international shipping terminal. The purpose of this project was to assist other ports in meeting Annex V requirements efficiently while promoting a positive image of the Port and its clients. While there are larger and smaller ports it is felt that many of the lessons learned in Newport are generally applicable to the various types of port operations.

This guide provides ideas as well as resources. It begins with a summary of the information contained in this report. A short introduction to the marine debris problem, and a description of the Port of Newport and the pilot project are included in the part called "Background". Each section of the "Guidelines" is designed to stand alone, so redundancies may exist in the points made. Section 1 contains recommendations for the port or terminal manager and an outline for a marine debris program. Subsequent sections contain information pertaining to forming and using an advisory group, defining refuse system needs and options, anticipating and recovering costs, refuse system operation and evaluation, and education and promotion. The appendices provide resources and supplemental information. Appendix 1 contains information about the changes made in the Port of Newport refuse reception system. Appendix 2 contains lists of available resources. Appendix 3 provides information on the recycling of plastics and references to other waste management information. The other appendices contain sample surveys, notices, press releases, activity ideas, and other items which can be used or adapted.

Garbage! Garbage! We're filling up the sea with garbage!
Garbage! Garbage! What will we do when there's no place
to put all the garbage?

(By Bill Steele and sung by Pete Seeger on the "Banks of
Marble" and "God Bless the Grass" albums)

CONTENTS

SUMMARY.....	1
BACKGROUND	
Introduction to the marine debris problem.....	11
Pilot Port Project--Background and Summary.....	13
GUIDELINES	
SECTION 1: Organizing a Marine Debris Program.....	15
A: Getting Started--Information for the Port/Facility Manager	
B: Outline for a Marine Debris Project	
SECTION 2: Forming and Utilizing an Advisory Group.....	18
SECTION 3: Determining Refuse Reception Needs and Options.....	22
A: Examine the Existing Refuse Reception System	
B: Determine the Additional Refuse Reception Capacity Needed	
C: Consider Waste Management Options	
D: Handling Refuse from Vessels with Foreign Port Calls	
SECTION 4: Costs and Cost Recovery.....	33
A: Changes to be Expected in Refuse System Costs	
B: Refuse Facility Costs	
C: Cost Recovery	
SECTION 5: Refuse System Operations and Evaluation.....	39
A: Plans Necessary for Smooth Refuse System Operations	
B: Involvement and Motivation of Refuse System Employees	
C: Evaluating the Performance of the Improved Refuse System	
SECTION 6: Education and Promotion.....	42
A: Conducting an Education Program	
B: Informing Port Users Who Do Not Live in the Vicinity	
C: Getting the Community Involved	
D: Encouraging Media Attention	
E: Using Promotional Materials	
F: Using Photographic Materials	
APPENDIX	
APPENDIX 1--Port of Newport Refuse Reception System.....	55
APPENDIX 2--Marine Debris Resources.....	65
APPENDIX 3--Waste Management Information.....	85
APPENDIX 4--Forms and Surveys.....	91
APPENDIX 5--Press Releases.....	99
APPENDIX 6--Beach Clean-ups and Other Activities.....	113
APPENDIX 7--Notices, Posters, Art and Poetry.....	122
APPENDIX 8--Refuse Handling Ideas.....	129

SUMMARY—DEALING WITH MARPOL ANNEX V

This summary provides an overview of the suggestions and information contained in the guidelines.

Ocean Pollution Problem

Marine debris, especially the non-degradable plastic items that are discarded at sea, is causing an increasing threat to marine life. Animals die from entanglement in items such as net, line, packing band straps and six-pack rings or from the ingestion of such common items as plastic bags and plastic and styrofoam pieces. Debris is also a hazard to mariners and can result in expensive repairs or lost opportunities.

New Plastics Regulations Effect All Ports And Terminals!

New U.S. and international laws effective December 1988, require ports and docking facilities to provide adequate refuse reception facilities for the plastic and other refuse materials their vessels are prohibited from disposing into the ocean (see Table 1). The Coast Guard is responsible for defining and enforcing the law for U.S. ports. Lack of compliance may result in restriction of operations or closure. Refuse which has been in contact with food materials acquired in foreign ports must be sterilized before disposal, according to Department of Agriculture regulations (see "Guidelines" Section 3D).

Cost Recovery Allowed— No Federal Money Available

Ports must provide refuse reception facilities for their users and may recover the costs by assessment of fees or other means. Cost recovery measures should not discourage compliance (see Section 4C).

Guidance Available From Demonstration Program

As a demonstration project, refuse reception facilities which conform to the anticipated requirements were set up or investigated at the Port of Newport, a medium sized Oregon port serving commercial fishing and shipping traffic as well as recreational vessels (see "Background"). Project experiences, considered applicable to ports both larger and smaller, reveal that port facility improvements may be had at low cost. A high degree of refuse return can be effected while keeping refuse disposal costs low by recycling and other efficiency measures. Ports may additionally benefit from this new obligation if a marine debris project is organized to address refuse facility obligations and education (see Table 2). This publication contains information and resources that have resulted from pilot project experiences.

1 Marine Plastic Pollution Research and Control Act of 1987 (PL 100-220).

2 Annex V of MARPOL (International Convention for the Prevention of Pollution From Ships).

Table 1.--Annex V discharge limitations.

MARPOL ANNEX V

Summary of Refuse Discharge Limitations

Refuse Type	All Vessels	
	<u>Outside Special Areas</u>	<u>In Special Areas^{†††}</u>
Plastics [†] - includes synthetic netting material and rope	Dumping Prohibited	Dumping Prohibited
Floating, packing and lining material	> 25 miles offshore	Dumping Prohibited
Paper, rags, glass, metal, bottles, crockery	> 12 miles	Dumping Prohibited
Ground paper, rags, ^{††} glass, etc.	> 3 miles	Dumping Prohibited
Food	> 12 miles	> 12 miles
Food comminuted or ^{††} ground	> 3 miles	> 12 miles

† Not apply to accidental loss of synthetic fishing nets, provided all reasonable precautions have been taken.

†† Ground refuse must be able to pass through a screen with mesh size no larger than 25 mm. (1 inch).

††† The Gulf of Mexico is being considered for designation as a special area.

Table 2.--Compliance with Annex V and more.

PORT REFUSE FACILITIES

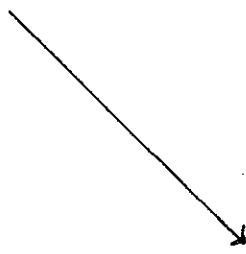
convenient
comprehensive
easy to use
adequate capacity
users help plan, evaluate
responsive to user suggestions



ADEQUATE REFUSE FACILITIES
FACILITIES & SERVICES



PORT COMPLIANCE WITH
ANNEX V REQUIREMENTS



EDUCATION

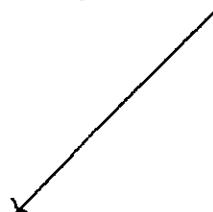
stresses in-person contact
involves all port user groups
addresses user concerns
involves community
pursues media coverage
uses a variety of mediums &
messages



EDUCATION OF PORT USERS
AND COMMUNITY MEMBERS



COMMUNITY SUPPORT OF PORT
EFFORTS & LEADERSHIP ROLE,
HIGH DEGREE OF USER
COMPLIANCE WITH ANNEX V
REGULATIONS



CLEANER, SAFER, MORE PRODUCTIVE
OCEAN AND SHORELINES

Getting Started

A person should be hired or reassigned to manage a marine debris program at the port (see Section 1). This person should be outgoing and able to encourage the input and support of fellow port employees and the port's users. The visible support of upper management for such a program is essential and should be demonstrated initially through a staff meeting where program goals are explained by upper management and staff involvement encouraged. Subsequently, management should emphasize the need for cooperation with record keeping and evaluation tasks and show support for the promotional activities of the project.

The port project should stress direct contact with port users and maintain high visibility at the port. An advisory group composed of port user group representatives, port management and other representatives of the marine community and municipality can help plan refuse reception facilities and generate awareness of the port efforts and the marine debris problem (see Section 2). Interviews conducted with large numbers of port users regarding their refuse facility needs will result in practical ideas for an efficient waste management system and create a sense of ownership in the port's project and a commitment to its success, as some of these suggestions are implemented. This cooperative problem solving effort will also provide a forum for positive media attention of both the port and its user groups.

Assessing Needs And Improving Refuse Reception Facilities

A thorough assessment of the existing refuse system and port needs will help assure efficiency and establish baseline information (see Sections 3A and 5C). The number and type of refuse facilities needed will vary depending on the activity, schedule, and kind of vessels in a port and port layout. These needs will become apparent through interviews of the port users. Refuse facilities should be located as close to the vessels as possible, have ample capacity, and be able to receive the various kinds of refuse regulated under Annex V of MARPOL (see Table 1). Containers for refuse and recyclables at the head of docks, at fuel docks, adjacent to hoists, or on a centrally located floating barge may provide vessels the greatest convenience (see Figure 1).

Estimates (from fishing vessels in Newport, Oregon) are that each person aboard a vessel generates on average about 4.5 gallons of mixed refuse for each day at sea. Additional refuse reception capacity is needed for the packaging that results from vessel provisioning, the refuse that results from vessel repair, and the industry-specific, operations related refuse (such as packaging and cargo materials, fishing gear, drums, sheeting, and pipe materials) (see Section 3B).

Increasing Refuse Reception Capacity

If current refuse reception capacity is not adequate it can be expanded by increasing the size or numbers of the containers available for refuse, having containers emptied more frequently, designating special refuse reception areas, increasing the available container space by manual or mechanical compaction, and by encouraging recycling.

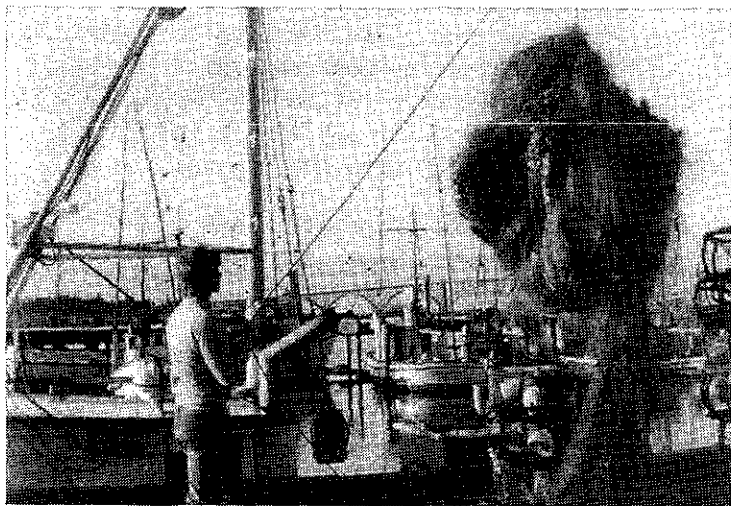
a.



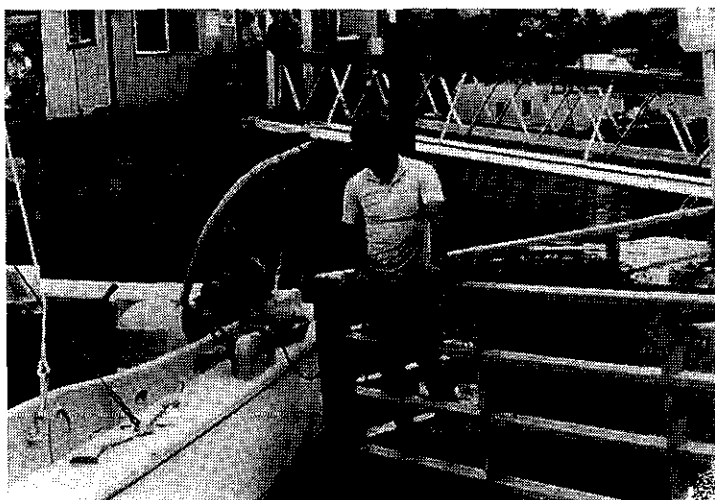
b.



c.



d.



e.



Figure 1. CONVENIENCE AND SERVICE ARE EMPHASIZED.

Containers or refuse disposal areas are located considering the type of refuse, standard vessel procedures, and ease of use. Here (a) a boater deposits trash in a container next to a vessel wash off area; (b) fishermen carry refuse off the floating docks to containers located at the top of the access ramp; (c) make use of a hoist to get rid of net found floating at sea; and (d) place net pieces on a floating barge. The port also provides fork-lift service to aid vessels in getting rid of other large items, such as this cable (e).

The recycling of bulky items such as nets, wood, metal, and cardboard, will increase the space available in refuse containers for other refuse and lower refuse disposal costs. These materials can be diverted from the refuse containers, by having space or containers to receive recyclables clearly designated and available adjacent to the refuse containers or in other easily accessed locations (see Figure 2).

Keeping Costs Low

Interviews with port workers and examination of port refuse operations may reveal ways to improve its cost efficiency. Refuse containers should be full when emptied, the dumping of home refuse discouraged by structural means or increased enforcement, the costs of various refuse disposal options compared, and recycling used to effect no-cost removal of items or to generate income from their sale. Increasing refuse container size and adjusting hauling and disposal schedules may result in better use of container space and labor and cost savings (see Section 4A).

Refuse reception facilities need not be high-tech to be effective. Ways may be found to adapt available port or industry-related materials such as wooden tote boxes, barrels, used shipping containers, barges, and trailers for refuse collection, separation, or storage (see Section 4B). If fork lift trucks or hoists are available, pallets or simply designated space may create reception capacity. These areas or containers should be clearly distinguished, perhaps by use of a bright and uniform color scheme. It may also be possible to find a way to use a ship's steam and adapt existing containers to create a facility which can effectively sterilize refuse from vessels which have called at foreign ports (see Section 3D).

Refuse System Operations and Evaluation

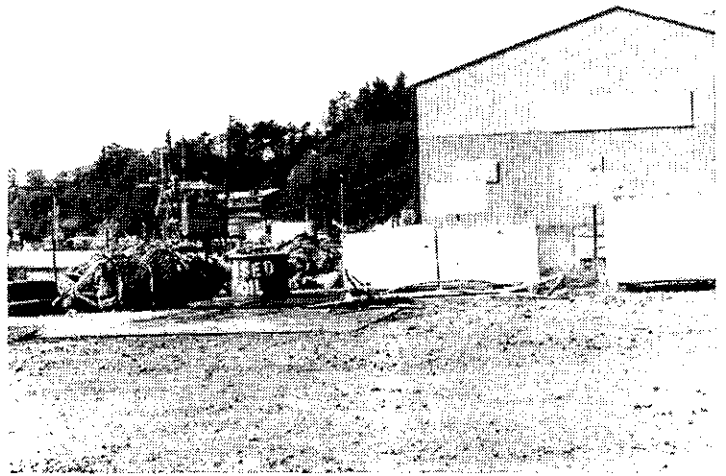
It is important that all aspects of the port's refuse system, including communications between port divisions and with refuse handlers from outside the port, be clearly understood (see Section 5A). Refuse system participants should understand the marine debris problem as well as understand the entire refuse management picture (see Section 5B). Port workers should be asked to keep daily records of refuse operations and refuse volumes so that the effects of refuse system changes can be evaluated and further improvements made. Port users should also be asked to reevaluate the refuse system after changes have been made (see Section 5C). As refuse disposal needs of users and port operational needs become clearer through these evaluations, funds can be budgeted and refinements made to increase the efficiency of service.

Getting Help With Educational Efforts

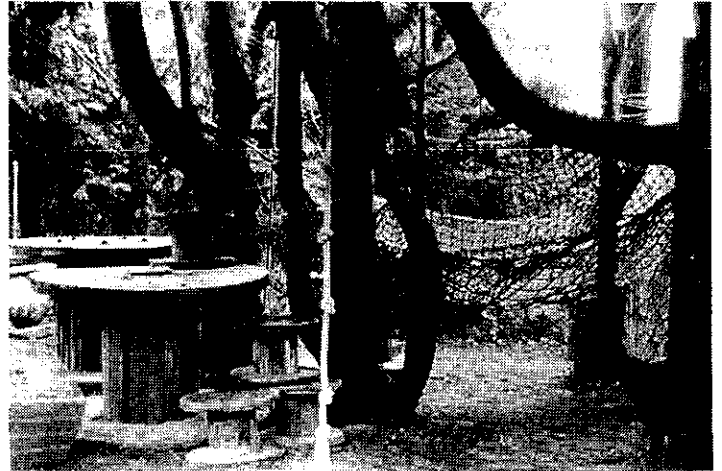
It will become apparent as port users and community members are contacted, that many feel strongly about getting the ocean cleaned-up and are willing supporters. These are key people to involve in an advisory group—people who will help plan and promote the marine debris project and accomplish its goals. All user groups should be represented in the advisory committee to assure that their disposal needs are addressed and to foster their industry's support (see Sections 2 and 6C).



a.



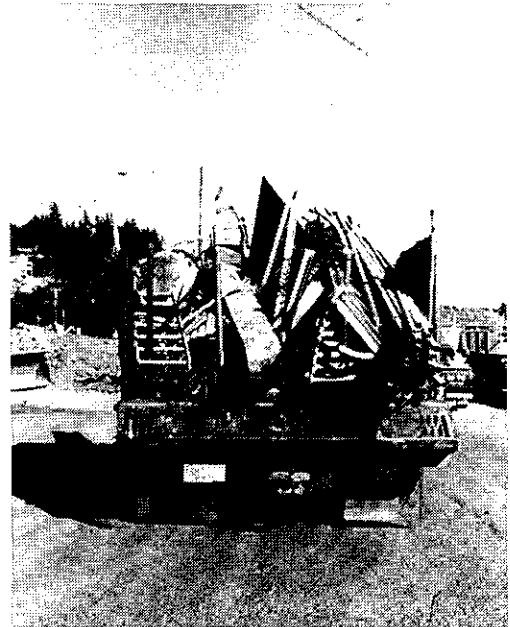
c.



d.



b.



e.

Figure 2. COMPREHENSIVE SERVICE OBTAINED AT MINIMAL COST.

The Port provides disposal areas to meet all the refuse disposal needs of the port's users. Costs are kept low by encouraging recycling. Clearly marked recycling containers adjacent to the refuse containers are well used and well liked. Mariners doing repairs can often find pieces of wood, metal, and net that prove useful. A fisherman (a) is seen returning cardboard packaging to the recycling containers, to be hauled away by the refuse company (b) at no charge. Nets found in the recycling area (c) are used to make many things, including this backyard playground (d). A scrap metal hauler collects the gathered metal and pays the port a price based on tonnage and composition (e).

Industry involvement is crucial since each group's members can most effectively motivate the support of their peers. The help of industry members can often be gained simply by asking for it, especially if a defined activity is suggested. Ports will also find help forthcoming from enforcement agencies which have marine duties and from groups which have boating safety, extension, environmental protection and fish and wildlife interests. These groups find it easy to incorporate marine debris information into talks and newsletters, disperse informational pamphlets and litter bags, and to host displays and presentations.

Service and environmental groups, schools, and community volunteers are also likely supporters of port efforts and will, when asked for assistance, prepare educational materials and exhibits, assist with recycling efforts, perform surveys and studies, prepare public service announcements, post posters, and disperse information. Promotional items such as decals and hats, beach and harbor clean-ups, post clean-up celebrations; and contests will help to involve others in enjoyable ways and generate pride in the actions being taken (see Figures 3 and 4).

Media coverage is important for increasing awareness and support. It gives visibility to port efforts and holds mariner attention if it asserts the local relevancy of the issue and emphasizes the progress that is possible. Contact press offices initially to explain port goals and ask for support. Press releases about local debris problems, the port's facility improvements, the positive actions taken by members of the user groups or community members, and promotional events, especially if accompanied by pictures or graphics, will increase the media coverage obtained (see Section 6D).

Slide and video educational programs, radio and tv public service announcements, informational pamphlets, posters, bumper stickers, and other resources are available at low cost (see Appendix 2).



Figure 3. THE PORT'S USERS ARE SUPPORTIVE AND INVOLVED.

Fishermen are active participants in the port's efforts to improve refuse facilities and increase awareness of the marine debris problem. Activities range from helping to assess port needs to teaching classes in the community. Pictured here are (a) fishers who serve on the project's advisory group; (b) the designer of a simple refuse container made from recycled materials, and (c) participants in the beach and bay clean-up efforts. Fishermen (d) also help to tape public service announcements and (e) are willing participants in promotional parades and events.

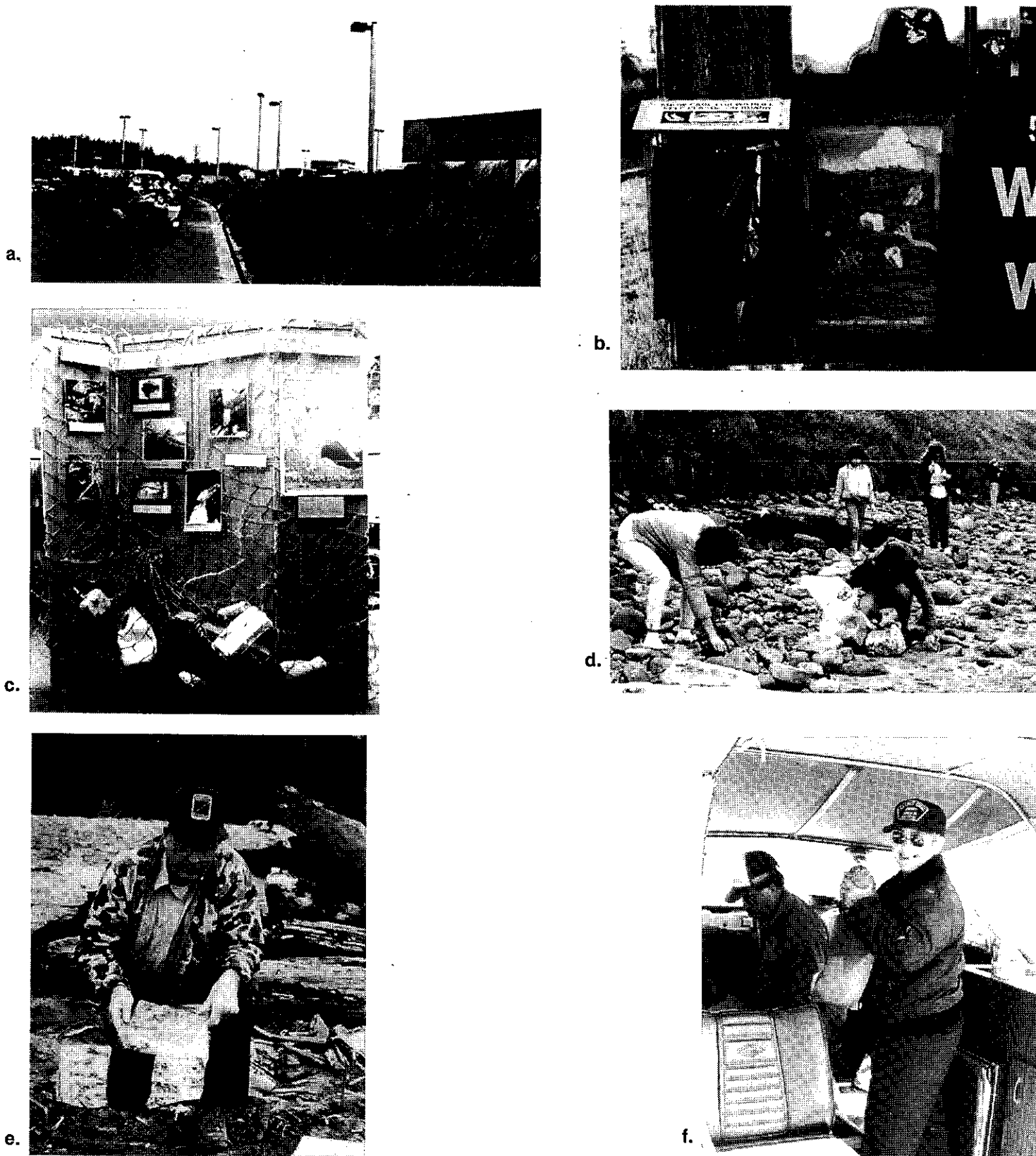


Figure 4. COMMUNITY EDUCATION AND PARTICIPATION ARE FOSTERED.

Awareness about the marine debris problem and its solutions is promoted through passive and active education and hands on experience. The media is interested in these efforts and provides extensive coverage and support, as do schools, educational centers, extension programs, and trade groups. Agencies and groups which have contact with mariners have included marine debris messages into their outreach efforts and written publications. Here (a) boaters pass a sign on the way to the launch ramp and (b) find litter bags available on the ramp for their use. Educational displays (c) have been made by schools and are followed up (d) by beach debris studies. Fish and wildlife agency personnel (e) report counts of plastic particles that can harm shore birds and Coast Guard Auxiliary members checking life jackets (f) also mention the safety hazard that plastic debris pose to mariners.

BACKGROUND

Introduction to the Marine Debris Problem

New U.S. law requires operators of port or docking facilities to provide adequate refuse reception facilities for their vessels. Failure to do so by December 1988, as determined by Coast Guard inspections, may result in restriction or closure of port operations. The new law is entitled the Marine Plastic Pollution Research and Control Act of 1987 (MPPRCA) and implements the provisions of an international treaty called Annex V of MARPOL (The International Convention for the Prevention of Pollution from Ships).

This harsh sounding measure is designed to end a serious and pervasive ocean pollution problem— plastic debris. The convenience of the ocean as a disposal site and the perception of the ocean as limitless have long made ocean disposal of wastes common place. Only recently have the extent and effects of this marine debris problem been recognized. In the early 1970's the National Academy of Science estimated that 6.4 million metric tons of garbage were being discarded into the ocean each year from vessels alone. Each year as much garbage enters the oceans of the world as there are fish caught in the United States!

A growing proportion of this garbage is plastic, virtually non-degradable in the ocean. Now even the ocean's vastness can't hide this persistent material. The remotest beaches in the Arctic and surface waters in the middle of the oceans are littered with plastic items from cargo, petroleum, and fishing industry operations, as well as crew generated packaging materials and the small plastic resin pellets from which all other plastic items are manufactured.

Economic losses are experienced by mariners and lives are threatened when propellers are fouled with ropes, sheeting and nets or when water intakes are blocked by plastic bags and sheeting. These problems are well known to mariners and seem quite common. Three studies of problems related to debris were conducted as part of the work of this project. Of the 90 fishermen interviewed at a trade show held in Seattle, Washington in 1987, 64% had experienced vessel problems due to plastic debris and had incurred an average cost of \$1910 for repairs and lost fishing time. Similarly, 58% of the 102 commercial fishermen interviewed in Newport, Oregon had debris related problems, with costs averaging \$2725 per vessel. Almost one out of every five of the 280 sports fishermen surveyed in Newport also reported problems with plastic garbage. The average repair bills for these 52 boats were \$100. (These studies are reported in a publication called "Report on a Port Based Project to Reduce Marine Debris", see ordering information in Appendix 2.)

Other economic concerns are noted by coastal states such as New Jersey and Texas as a growing amount of debris litters their beaches, causing losses in tourism revenues and requiring many millions of dollars in clean-up efforts.

Millions of marine mammals, sea turtles, sea birds, and fish die each year from entanglement in or ingestion of plastic debris. Animals are entrapped in such common items as fish net, line, rope, cargo strapping bands, monofilament line, and six-pack loop connectors. Items ingested include plastic bags, sheeting, plastic resin pellets, packing materials, small plastic items such as cigarette lighters, and the pieces resulting from the disintegration of styrofoam and hard plastic items.

Some studies such as those done by Dr. Charles Fowler and others for the National Marine Fisheries Service (NMFS) in the Pribilof Islands of Alaska, indicate that entanglement may be a principle cause of mortality for the threatened northern fur seal population whose numbers may decline by as many as 50,000 animals a year. Other marine mammal populations may be similarly effected. Entanglement of the protected brown pelicans in monofilament line is considered a major problem by the U.S. Fish and Wildlife Service. In the North Pacific, entanglement of other sea birds such as auklets, puffins, murres, and shearwaters has been noted. Hundreds of sea birds at a time have been observed entangled in lost or abandoned pieces of high seas gill nets. The entrapment of sea-turtles in pieces of net and line has also been documented.

Plastic items are ingested by many marine organisms either non-selectively during normal feeding operations or by choice when plastic items are mistaken for their preferred food items. Large quantities of ingested plastic may cause intestinal blockage, may damage intestinal walls or may cause nutritional problems by creating a false feeling of satiation, or by reducing the absorption of nutrients. Studies conducted by Day and others show that at least 50 of the world's 280 sea bird species are known to ingest plastics. The Smithsonian Institute reports nine species of whales and dolphins known to have ingested plastic bags. NMFS studies also show that five species of sea turtles, all considered threatened or endangered commonly ingest plastic bags and sheeting, apparently mistaking these items for their jellyfish prey.

Because of international concern over these impacts, Annex V of MARPOL was ratified by the United States in December of 1987. Having received the required ratification by 27 nations representing 50% of the world's shipping tonnage, Annex V of this treaty becomes binding in December of 1988. It prohibits vessels from signatory nations from disposing of any plastic material into the ocean (as well as other materials, see Table 1, p.2). The treaty also recognizes that efforts by mariners to retain plastics would be frustrated if, upon return to port, there was no place to conveniently off-load this refuse. It therefore requires that ports in these nations provide adequate refuse reception facilities.

Pilot Port Project— Background and Summary

In December of 1986 a meeting was coordinated by NMFS, West Coast trawl fishermen, the Oregon State University Extension/Sea Grant Program and the Port of Newport, to refine the goals and outline for such a pilot port program. The goals were three-fold:

1. Improve port refuse facilities: assess the adequacy of the existing refuse system and improve it to allow vessels to easily get rid of their plastic refuse upon return to port.
2. Educate port users: encourage mariners to retain plastics and other materials on board and to use the port refuse facilities by building awareness about the marine debris issue.
3. Share project results: keep track of the costs involved and the methods used to improve facilities and encourage awareness and share these findings for the benefit of other ports.

The Port of Newport in Newport, Oregon was considered a good port for the program since it was relatively small in size but was diverse and active. This diversity was anticipated to allow the application of experiences to ports both larger and smaller. The marine debris program, called "The Marine Refuse Disposal Project", was conducted between January 1987 and March 1988. A total of \$97,000 was granted by the Marine Entanglement Research Program of NMFS for this project, with the Port of Newport pledging \$29,000 in-kind support.

Newport is a city of 8300 people, located on the central Oregon coast. Commercial fishing is vital to the area's economy and is supported by many marine industries and suppliers. It contributed \$84 million dollars in direct and indirect personal income to the local economy in 1987. Forestry, recreational fishing, and tourism also contribute significantly. The Port is important to all these industries. It supplies moorage and services to up to 800 commercial fishing vessels, operates a launch ramp and a 600 berth recreational vessel marina which caters to about 1400 recreational fishermen, and has a two-berth deep draft shipping terminal which allows the movement of logs and lumber to domestic and foreign markets on the 20 or more ships and barges that call each year. The commercial vessel moorages, the recreational vessel marina, and the shipping terminals occupy physically distinct areas of the port property, and are managed separately.

Commercial fish landings in Newport are among the highest on the west coast. Between 26 and 48 million round pounds of shrimp, groundfish, salmon, crab, tuna, and scallops are delivered annually to the fish processing plants by trawlers, draggers, trollers, and pot fishermen. These fish are sold for an ex-vessel value of between \$9 and \$21 million dollars each year. Additionally, Newport is the major port for the vessels of the "Distant Water Fleet"— those trawl fishermen who fish in joint venture operations with foreign nations, principally off Alaska. In contrast to the commercial fleet, whose vessels are fished year round by community members, about 75% of the recreational fishermen live out of town, making use of their vessels mostly during late spring through early fall weekends and vacation time.

Our 15 months of experience with this project have led us to believe that compliance with Annex V can be a positive experience for a port. We found that as mariners became aware of the debris problem through education they began returning their refuse to port and became interested in helping the port to define the facilities needed. A recycling system set up at the docks serving the commercial fishermen received both the fishermen's and the port worker's cooperation and actually decreased refuse disposal costs, despite the much increased quantity of refuse being returned to port.

As the support for the marine debris program and port efforts grew among the fishermen, community support also grew. The Port was proudly supported by the local newspaper and help was forthcoming from diverse groups such as enforcement agencies, schools, refuse companies and recyclers, as well as groups like the Chamber of Commerce and the health department. Posters and promotional items appeared all over town and were dispersed up and down the coast by fishermen and other supporters. Volunteers taught classes, did beach debris studies, encouraged the interest and cooperation of their peers and generally turned the "port project" into their project. Environmental groups, coastal planning groups, service organizations as well as fisheries groups wanted to find out how they could get involved or foster similar projects.

The port has received positive acclaim for these marine debris efforts and has benefited from this interest with positive and widespread media coverage. The sense of ownership that evolved as well as the cooperation that was fostered has helped our image in taxpayer's minds and may allow the port to gain support more quickly in future, unrelated endeavors.

(A summary of Newport refuse operations can be found in Appendix 1.)

GUIDELINES

SECTION 1— ORGANIZING A MARINE DEBRIS PROGRAM

1A: GETTING STARTED— INFORMATION FOR THE PORT/FACILITY MANAGER

The following are some suggestions to help get things underway:

1. Accept that you will probably need to improve your refuse facilities and that you will be involved in public education.
2. Review this reference guide.
3. Order preliminary resource materials: marine debris and port project video tapes, fact sheets, and posters (see order form, Appendix 2).
4. Choose someone to be responsible for running the marine debris project and fulfilling Annex V requirements. (Hire or re-assign an energetic person who will get out on the docks, can get along well with and motivate port users and fellow employees, and who is committed to keeping the ocean environment clean.)
5. Visible support of upper management is essential.
 - a. Grant a name to this project and give the person in charge a title.
 - b. Meet with this employee and stress the port's concern with providing service and meeting these new legal requirements fully and substantively. Discuss guidelines and establish a budget and management goals.
 - *c. Call a full staff meeting:
 - Introduce the project and project leader.
 - Show the video tapes about marine debris and the port project.
 - Inform staff about the effect of Annex V on the port and port users.
 - Direct the staff to cooperate with this project, help inform users of the new law, and supply ideas about improving refuse service.
 - Ask the staff to note their ideas during this meeting (see sample questions Appendix 4) and to post a notice or poster around the port area or municipality.**
6. Set up a regular meeting schedule with the project leader for briefings and turn this guide over with recommendations.

* All employees should be asked to attend, be they dock worker, engineer, planner, secretary, or harbor master. This might take multiple meetings but may well be the simplest and most crucial determinant of the benefits which will accrue to the port.

** By contributing immediately, the staff will also be "buying in" to making this project a success, and will provide some valuable and creative ideas to the project leader.

1B: OUTLINE FOR A MARINE DEBRIS PROJECT

The following is a general plan for a marine debris project. Many of these activities can be concurrent:

1. Make sure preliminary marine debris information, posters, and videos have been ordered (see order form, Appendix 2).
2. Get to know the port layout and operations.
3. Ask the port manager to call a staff meeting to encourage support of the project (see Section 1A).
4. Develop and display informative signs, notices, and posters.
5. Visit the editors or reporters of the local press offices. Explain project goals and ask for their support. Find out the desired format for press releases. (Give them a press release (see Appendix 5) and a fact sheet about marine debris).
6. Observe the existing port refuse handling systems (if any) to identify problem areas or times, and problematic refuse items. Note the costs and labor involved (see Section 5C). Keep written records.
7. Ask port users and port workers to help evaluate and improve the refuse reception facilities. Ask questions regarding ease of use, capacity needs, and the quantity and composition of refuse needing disposal (see Section 3A and Appendix 4). (It is important to talk with as many people as possible, even if one begins to hear the same information, because this is an excellent way to involve and inform people and bring visibility to the project.)
8. Study the available waste disposal options in the area: identify the systems used to handle municipal waste by talking to waste haulers, landfill or incinerator operators, recyclers, health department and city officials (see Section 3C).
10. Speak to the operators of neighboring docking facilities to see if efforts can be collaborated.
11. Create an advisory panel of port users. Hold an initial meeting to review Annex V requirements, the marine debris problem (show the video tapes ordered above, see 1), discuss refuse system problems and solutions (see Section 2). (Send out another press release.)
12. Improve the facilities as indicated from the above observations, studies, and input.
13. Arrange for material disposal, get to know the haulers, and supervise the first few refuse and recyclable material pick-ups. The recyclers and haulers can be asked to provide suggestions for improvements in system design and efficiency.

14. Advertise the facilities (post notices letting mariners know of the services available to them and write a press release).
15. Have port personnel evaluate refuse services, keep records, solicit input from port user groups, and suggest improvements.
16. Evaluate the workings of the improved refuse reception system by asking for the critiques of the port's users (see Section 5C).
17. Make additional improvements as suggested. (Send out another press release).
18. Add to the advisory panel representatives of enforcement agencies, schools, wildlife and park agencies, city, recyclers, haulers. (Call or provide information to the press.)
19. Hold an advisory group meeting to discuss educational program development and methods. Solicit their assistance in accomplishing program objectives (see Sections 2, 6A and 6B).
20. Promote the educational campaign (perhaps with some major event e.g., advisory group cleans beaches, adopts a harbor, holds a contest, parade, dock party, etc.). (Inform the press.)
21. Ask for assistance and support from leaders of the port user groups. Ask for help with specific actions e.g., to accompany the project manager in talking to others on the docks, to present a slide show, distribute 50 brochures, introduce the issue at a meeting and lead discussion, give a press interview, or to keep the port informed of positive actions of their peers or of any refuse disposal problems (see Section 6C).
22. Give presentations to local user and service groups and schools or ask advisory group members do so. Suggest possible activities to be undertaken and define the help that is needed. Ask for assistance in specific tasks (as one organizer says— CREATE DISCRETE AND MANAGEABLE TASKS) (see Section 6).
23. Keep records which will allow for the evaluation of the effectiveness of the educational efforts. Make improvements as necessary.

SECTION 2 — FORMING AND UTILIZING AN ADVISORY GROUP

Why Form An Advisory Group?

An advisory group can provide a core of strength and support for a marine debris project. Advisory group members help plan educational and promotional activities, providing ideas drawn from a diverse range of experiences and backgrounds. Members broaden the choices, activities, and resources available to the project. Additionally, and importantly, each member's involvement expands the personal reach of the project to their family, friends, and colleagues.

How An Advisory Group Works

An advisory group meets initially to generate ideas, discuss directions and goals, and to set up an action plan. It then meets periodically to discuss progress and difficulties, coordinate actions, and plan activities. Also advisory group members may be contacted for advice and assistance as required.

Composition of the Advisory Group

Consider including :

- port representatives: port management, refuse project management, port refuse handlers.
- port user group representatives: each major user group should be included (e.g. members of fishing, boating, charter, cruise, shipping, oil, Navy, and Coast Guard groups).
- refuse and recycling company representatives.
- enforcement and boating safety groups.
- fish and wildlife, natural resource, and environmental groups.
- representatives from the school, business, health, and arts communities.
- media representatives.

Newport Advisory Group

Advisory group involvement was one of the primary reasons for the successful adoption and spread of the marine debris program at the Port of Newport and within the community. The organization and workings of the Port of Newport's advisory group are explained below.

Composition of Newport Advisory Group

Conversations with port personnel and marine extension agents helped define the representation needed and generated names of persons who could be invited to serve. A small group was suggested initially, to facilitate the group's workings, but it was decided to incorporate a larger

community representation. The advisory group was a large but workable group of 25 people from outside of the port. Joining the group from the port were the port manager, the port harbormaster, the terminal manager, and the marine debris project manager and project assistant.

Represented on the advisory group were:

- 6 commercial fishermen- representing a variety of fisheries' types
- 2 marine extension agents (one of whom is also a fisherman)
- member of Fishermen's Wives group
- charter boat company owner
- private marina owner
- fish processing company owner
- U.S. Coast Guard Station commander
- Coast Guard Auxiliary member (group works with recreational fishers/boaters)
- County Sheriffs (marine enforcement member)
- State Police (game enforcement member)
- State Fish and Wildlife Department member
- private refuse company owner
- recycling coordinator for the county
- County Health Department director
- school system representative (curriculum and instruction department)
- City of Newport representative
- Chamber of Commerce president
- State Coastal Zone Management Agency director
- citizen (ex-port commission member)

Communication With Newport Advisory Group Members

Meetings, letters, copies of written materials and reports, phone calls, and visits served to exchange information between the project management and advisory group. Notices of the meetings which informed of the date, time, and place of the meeting, as well as the purpose for the meeting were sent out to advisory group members in advance. Members were usually telephoned a day or two before the meeting as a reminder.

Meetings With Newport Advisory Group

Meetings or activities brought the advisory group together once a month for the first five months of the project. Subsequently meetings were held about once every 3 or 4 months (with smaller groups of group members getting together occasionally to plan activities).

The first meeting of the advisory group was held before the end of the project's first month, after a preliminary assessment of the Port's refuse system was conducted. Before the meeting, prospective members had been visited, invited to serve, and had been talked to individually about the goals of the project and their ideas and concerns. The first meeting served to introduce members to each other, gain a more thorough understanding of the marine debris problem, and to generate ideas for project action through a brainstorming session (see section 6C). After the meeting, notes from the brainstorming session were organized and dispersed to members for their review. The second meeting, held a month later, served to prioritize these ideas into an action plan.

A month later the third advisory group get-together was held. It was not a meeting per say, but a media event, where the group came together to sport promotional hats and sweatshirts and advertise the port's improved refuse facilities.

Another promotional event held the following month, a parade, brought advisory group members together once again, and subsequently a meeting was held to discuss progress and reorientate to future plans. Subsequent meetings served to exchange information, delegate work, organize or coordinate events, and keep abreast of marine debris information and project progress. Additionally fishermen, enforcement, and port members of the advisory group were called upon occasionally to meet with television and magazine reporters, or to assist government representatives in their rule making work.

Attendance At Meetings

Attendance at the meetings was variable, with no fewer than 8 members present at any meeting. Some meetings were held during the working hours of the members, making it difficult for many to attend. An evening meeting, an early morning meeting, and a lunch meeting were well attended, as were partial group meetings over breakfast, or in the early evening hours.

Structure of Meetings

An agenda was prepared by the project manager for the meeting and posted or reviewed at the start of the meeting. The agenda was flexible and advisory group members could add to it. If much material needed to be covered during the meeting, items on the agenda were allocated a maximum time limit. The project manager facilitated discussion at the meeting and served to keep discussion focused on the topic at hand. The decision making structure was informal, discussions usually leading to agreement on activities to be pursued or an action plan. If work needed to be done, specific tasks were designated and assistance was solicited for each.

Activities Pursued By The Newport Advisory Group As A Whole

All advisory group members participated in the following activities:

- formulated ideas for project direction, action, and promotion.
- posted notices and posters around town, and at work place.
- distributed brochures.
- talked about project with peers, friends, and family.
- participated in promotional events (parade, beach/bay clean-up, media events, etc.).
- sponsored and coordinated the first ever bay clean-up.
- wore promotional clothing, and displayed decals and stickers on their cars and on their vessels.

Activities Pursued By Individual Advisory Group Members.

Some members contributed further to the project. They:

- provided guidance, support, and counsel to the project manager.
- wrote letters to their peers to influence action.
- distributed posters coast-wide.
- spoke to their peers about the marine debris problem (in casual conversations, at industry meetings, and over the marine radio).
- spoke to their fish processing plants to encourage the establishment of convenient refuse reception facilities.
- presented talks and marine debris slide shows to their peers or students.
- took visitors on tours of the port docks and provided explanation of the port's program.
- developed a school photo display and worksheet on marine debris.
- set-up and staffed a photo display at the county fair.
- performed beach litter surveys.
- gave press interviews and helped develop public service announcements.
- integrated marine debris activities into their group's activities. (e.g. state police member organized slide show for state-wide trooper meeting, sheriffs, police, and Coast Guard Auxiliary handed out litter bags to vessels, Chamber of Commerce member encouraged other members to involve themselves in the beach clean-up).
- began a similar program in another state by talking with fishermen on the docks and by encouraging the active involvement of the industry group in the promotion of debris education.
- encouraged state legislative support to help other ports get started on similar projects.

SECTION 3: DETERMINING REFUSE RECEPTION NEEDS AND OPTIONS

3A: EXAMINE THE EXISTING REFUSE RECEPTION SYSTEM

It is necessary to determine the adequacy of existing refuse systems at the port before planning any expansion or changes. This will assure that facilities are efficiently tailored to meet users' needs. It is essential to involve port users in the evaluation and planning of the refuse reception facilities. Such input will not only assure the provision of adequate service, but will be a key to their subsequent support, assistance and compliance. Participation increases awareness of the marine debris issue and the port's efforts. It also creates a sense of commitment and responsibility towards finding solutions to the marine debris problem.

Assess the present refuse handling system by identifying existing conditions, problems, and attitudes. Use a combination of the methods listed below, with stress placed on those which involve direct dialogue with users and potential refuse system collaborators. (This information will also provide good baseline information for subsequent evaluations, see Section 5C.)

To assess logistical conditions:

1. Interview port users in person (on the docks) regarding the types and quantities of refuse generated, percentage of refuse being returned, the adequacy of the existing system, and the additional services and facilities needed (see Appendix 4).
2. Interview port workers regarding the existing refuse system's adequacy, ease, labor intensity, and needs (see Appendix 4).
3. Survey vessel owners/operators by mail (as in 1).
4. Attend user group meetings or organize planning workshops to solicit information and ideas.
5. Observe the use of the present refuse reception facilities and estimate the percentage of refuse being returned to port.
6. Observe the existing refuse system and note its capacity, efficiency, convenience, visibility, cost, and problems.

To determine existing attitudes and relevant social and political factors:

1. During interviews, note if port users and port workers are aware of Annex V requirements and the reasons for the new laws.
2. During interviews, note the attitudes that exist towards refuse handling and recycling, and what experiences port users have had with regulations for oil and marine sanitary devices.
3. Consider the relationships that exist between the port and its users, between the port management and port workers, and between the port and the community. Has the port demonstrated responsiveness to user and worker suggestions in the past?

3B: DETERMINE THE ADDITIONAL REFUSE RECEPTION CAPACITY NEEDED

Coast Guard to Determine Capacity Requirements

Regulations presently being written by the U.S. Coast Guard will define what measurement standards will be used to judge if a port is providing the required "adequate refuse reception facilities". Capacity requirements will be one of the areas addressed and **Coast Guard information will supercede information provided in this section.** Additionally, if the port receives vessels which have been in foreign ports, refuse reception facilities will need to meet Department of Agriculture Animal and Plant Health Inspection Service (APHIS) requirements (see Section 3D).

In qualitative terms the additional capacity needed under Annex V is that capacity which will allow the port to receive all the refuse that vessels are required to retain. The capacity of refuse reception facilities is determined by the total volume of the refuse containers and the frequency with which they are emptied. Increasing the number or size of refuse receptacles or the amount of emptying will increase capacity.

Determining Refuse Capacity Needs

To obtain information pertinent to determining refuse capacity needs:

1. Review results of the evaluations of the existing refuse system (see Section 3A).
2. Apply estimates (from pilot project studies) of what refuse quantities might be expected to be received from vessels (see Table 3).
3. Study the composition of the refuse being offloaded to anticipate recycling and reuse potential (see Appendix 4).
4. Note trial and error experiences as facilities or services are added*.
5. Review the refuse records from previous years to determine patterns and fluctuations in refuse facility use. (Note seasonal differences and differences due to shipping traffic variability.)
6. Talk with the operators of proximate docking facilities to assess mutual needs and potential collaboration.
7. Review the applicable laws and regulations (e.g. APHIS, local, county, and state refuse ordinances and health codes).

* Have port employees monitor refuse levels as more or larger volume containers or recycling bins are added or a more frequent hauling schedule is established. Adjust these factors as needed, making sure to anticipate the need before an overflow situation exists. As port users begin complying with regulations it is better to err on the high side when estimating refuse capacity needs. Even though this might result in some initial inefficiencies, users needs will be served, they will be encouraged to return refuse, refuse will not be all over the docks, and the port will have some time and flexibility for making changes.

Table 3.--Amount of refuse generated by vessel type. The quantities of refuse generated (by volume) by recreational and commercial fishing vessels and a research vessel at the Port of Newport were studied and are presented below. A calculation of refuse generated (by weight) taken from studies on Naval vessels is also presented (F). Different means of estimating port usage and refuse volumes were used in the calculations. Correction factors have been applied to calculations A, B, D, and E; explanations of the calculations follow. The following assumptions are made: 100% return of refuse to port, refuse is mixed in composition (except for G), and no recycling is used.

<u>Port/Vessel Use Calculation</u>	<u>Type of Vessel</u>	<u>Refuse Volume</u>
A. Number of days vessels registered in port, taken from nightly inventory record.	commercial fishing	12-16.5 gallons per vessel/day
B. Fish landing records (number of vessels making fish deliveries to processing plant).	commercial fishing	71 gallons per fish landing record
C. Refuse generated by vessels from fishermen reports	commercial fishing	11.6 gallons per vessel/day 4.4 gallons per person/day
D. Estimate of average number of vessels served each day	recreational- fall/spring summer	3.75-6.5 5.0- 8.8 gallons per vessel/day
E. Vessel launch records and estimates of use of moored vessels	recreational	5.2-5.6 gallons per vessel/day
F. Based on vessel complement	Navy*	3.0 pounds per person/day
G. Vessel complement 30 persons	research	0.4 gallons per person/day <u>only plastic refuse</u>

* From a study commissioned by the NOAA/National Marine Fisheries Service Seattle, WA. under contract number 85-ABC-00203.

CALCULATIONS FOR TABLE 3

A. Calculation based on records of commercial fishing vessels:

- a. refuse volume: total volume disposed of per year (920 cubic yards (1986), 848 cubic yards (1987)). 1 cubic yard = 216 gallons
- b. port use: vessel days registered in port during the year (taken from nightly vessel inventory record). (45,350 (1986), 57,573 (1987))
- c. gallons of refuse per vessel day in port = 3.2-4.4 gallons
- d. correction factor = 3.75
(1.25 (assuming an 80% return rate in Newport, figure is corrected to a 100% return of refuse) x 3.0 (volume of recyclables not included, refuse capacity needs would be at least three times greater without recycling).
- e. Corrected volume: 12.0-16.5 gallons per vessel/day registered in port.

B. Calculation based on commercial fishing vessel records:

- a. refuse volume : total refuse disposed of in a year at the port (753 cubic yards, 1987, November not included).
- b. port use: the number of fish landing records (8391) recorded at the fish processing plants in 1987, November not included).
- c. gallons of refuse per fish landing record = 19
- d. correction factor = 3.75 (see A.d. above).
- e. Corrected volume = 71 gallons per fish landing record.

C. Calculation based on commercial fishing vessel records (see p.61):

- a. refuse volume: amount of refuse per vessel as reported by fishermen in a survey.
- b. vessel use: vessel complement between 1 and 4 persons.
- c. gallons of refuse per vessel per day = 11.6
gallons of refuse per person per day = 4.4
- d. correction factor = none, but note that this figure does not account for provisioning and repair refuse, so additional capacity will needed to handle refuse generated in these operations.

D. Calculation based on recreational vessel records:

- a. refuse volume: from records kept of refuse containers emptied during weekend use periods.
- b. port use: rough estimation of the average number of recreational vessels served (115 vessels during fall, spring weekends, 250 vessels during summer weekends.)
- c.

Containers Emptied/Day (50 gallon refuse cans)	Volume/Day gallons	Volume/Vessel/Day gallons
7-12 (fall, spring)	350-600	3.0-5.2
20-35 (summer)	1000-1750	4.0-7.0
- d. correction factor = 1.25 (assuming an 80% return of refuse in Newport, figure is corrected to 100% return).
- e. Corrected volume = 3.8-6.5 gallons per vessel/day during fall/spring.
5.0-8.8 gallons per vessel/day during summer.

E. Calculation based on recreational vessel records:

- a. refuse volume: total volume disposed of in a year (755 cubic yards (1986), 802 cubic yards (1987)). 1 cubic yard = 216 gallons of refuse.
- b. port use: number of vessel use days (30387 (1986), 29095 (1987)), calculated on basis of launch ramp records and estimates of use of moored vessels.
- c. gallons of refuse per vessel use day = 5.2-5.6.
- d. correction factor = 1.25 (see D.d. above)
- e. Corrected volume = 6.5-7.0 gallons of refuse per vessel use day.

F. Calculation based on a study of naval vessels:

- a. refuse weight: calculated on the basis of the weight of the materials used for packaging of the vessel stores.
- b. vessel use calculated on basis of vessel complement.
- c. weight of refuse per person per day = 3.0 pounds.
- d. correction factor = none, but note that this figure does not account for provisioning and repair refuse, so additional capacity will be needed to handle refuse generated in these operations.

G. Calculation based on a study on an oceanographic research vessel which saved only plastic refuse:

- a. refuse volume: records kept of volume of plastics put into trash compactor (651 gallons in 60 days).
- b. vessel use: complement of 30 persons.
- c. Gallons of plastics per person per day = 0.4
- d. correction factor = none, but note that this figure does not account for provisioning and repair refuse, so additional capacity will be needed to handle refuse generated in these operations.

3C: CONSIDER WASTE MANAGEMENT OPTIONS

Gathering Waste Management Information

When the assessment of the existing refuse system has been completed, (see Sections 3A and 3B), it will be possible to consider what refuse handling options will best serve the port. One is looking for those options which will allow refuse handling at the port to be smoothly integrated into other port activities or to be easily coordinated with outside refuse and recycling operations.

Waste management can be a complicated subject. Local refuse and recycling company operators will be able to supply information about available services and alternatives. Since waste handling is often a highly politicized, competitive field, make sure to pursue a variety of opinions and information sources, keep an open mind to possibilities, and negotiate for improved service and cost options.

Local or university libraries as well as state and county agencies and environmental groups often have information related to waste management. If further background is desired refer to the books cited in Appendix 3. Information and references on plastics recycling and the recycling of other materials are also included in that appendix.

Waste Management Operations

It is useful to think of waste management in terms of three interrelated operations: collection, hauling, and disposal. A port may only have to deal with one or two of these operations, but it is important to understand all three. Such an overview is critical because disposal methods can influence collection methods and costs, and conversely collection methods can significantly effect disposal options and consequently, the costs. Equipment needs will depend on the options chosen. Lists of considerations for the various operations are presented below.

Collection Considerations

Collection refers to the accumulation of refuse in port and may involve collection, storage, and handling considerations. Think about the following questions:

1. How is refuse stored on board the vessels and in what containers will it be delivered?
2. How does the port layout influence refuse disposal behavior? How can refuse reception containers be placed to provide greater convenience?
3. How and where will refuse be accepted/collected at the port?
4. Can port users easily locate the facilities, read and understand the signs and directions? (Consider using a bright color to identify all refuse facilities and refuse information, and try to coordinate this with other area ports and docking facilities.)
5. Is any treatment required/desired before acceptance (sterilizing, bagging, coiling etc.)?

6. Will the port be involved in the handling of the refuse? (How will they be involved and how often?) Can port labor be made available to maintain equipment and keep records?
7. What pick-up services will the refuse companies provide?
8. Can other port services, labor, or equipment be made available or adapted to refuse collection needs?
9. What capacity is needed (see Section 3B)?
10. Is it possible to collaborate collection efforts with proximate docking facilities?
11. What options exist for the containment and storage of refuse? (Consider the options of refuse compaction and recycling too).
12. What are the costs and labor requirements for the various collection, storage and handling options? (Investigate ways to increase efficiency by changing container sizes and handling schedules and by recycling.)
13. Does the collection system provide for long term adaptability in terms of capacity and cost?
14. Do the budget and plans of the port consider refuse reception needs?
15. What are the long range planning goals for the port? Have refuse service needs been considered in these plans?
16. Are grants or financial assistances (local, state, and federal) available for refuse facility improvements or cottage industry or economic development?

Hauling Considerations

Hauling refers to movement of refuse away from the port to a transfer station or a disposal site and might be conducted by the port, a private hauler or contractor, or a public company. The following are important considerations:

1. How are refuse disposal costs assessed (i.e. by volume or by weight?
2. What legal requirements and restrictions apply related to hauling frequency and service? (Seek formal legal opinions early in your planning process if questions exist.)
3. What are the mechanisms, cost, feasibility, and legality of the port hauling refuse to various disposal sites?
4. What level of service can be provided by the different refuse companies and at what cost?
5. Can the automated pick-up of recyclable materials be arranged with a recycling or refuse company?

Disposal Considerations

Disposal refers to final disposition of the refuse. Choices may depend on:

1. the refuse composition.
2. the handling of the refuse in port.
3. if markets exist for various refuse materials.
4. if needs exist for reprocessed goods and/or energy. (Consider the community skills and needs, i.e. does a possibility exist for cottage industry development in the recycling or reprocessing of refuse materials? Can recycled materials fill a community need for heating or construction materials, for decoration or other uses?)

5. what landfill/resource recovery/incineration operations are available, affordable, or applicable to the port and municipality.
6. the costs of disposal at the various sites.
7. the schedules of operations at disposal sites (when are they open?).
8. the time and costs required to transport refuse to the disposal sites.
9. what materials are purchased or hauled by area recyclers or accepted for recycling at the various disposal sites.
10. applicable laws. Consider land use, pollution, health, and refuse disposal laws of the city, county, state, and federal governments.
11. the climatic and physical features of the area (temperature, rainfall, topography, geologic stability, water table level, insect, animal, and disease prevalence).

Notes on disposal methods

Below are listed common disposal methods. Those methods marked with an asterik are considered risky practices due to public health, safety, and/or ecological considerations. Refuse may be:

1. placed in a sanitary landfill.
2. compacted and put in a sanitary balefill.
3. incinerated in a high-tech plant with ashes requiring landfill disposal.
4. separated to be reused, recycled, or reprocessed with non-recoverable materials requiring disposal by one of the three methods above.
- *5. burned outside, on site or elsewhere, with residue requiring other disposal.
- *6. dumped on land or buried.

Equipment Considerations

The equipment necessary for proper disposal of refuse is outside the scope of this report. These considerations apply to the collection and hauling of refuse to the disposal site. The type and quantity of equipment needed will be determined by the amounts, types, and locations of facilities (as above) and by considering:

1. in what form refuse will be disposed of in port. That is, will refuse be in bags or containers, bundled, loose, or compacted?
2. how refuse will be transported to refuse collection points. Consider, for example, if refuse will be manually offloaded and carried by persons on foot or if it will be lifted with a crane or hoist, or transported with a fork lift.
3. where refuse will be collected. (Consider if refuse will be collected on the docks, at an access point to a dock, on a barge, or on another vessel, etc.)
4. how reliable/serviceable equipment is. If equipment breaks down is there a substitute? What are the maintenance requirements of the equipment?

3D: HANDLING REFUSE FROM VESSELS WITH FOREIGN PORT CALLS (APHIS REQUIREMENTS)

Any garbage offloaded from a vessel (foreign or domestic) which has been in any ports outside of the continental United States or Canada is a potential source of plant and livestock pests and diseases. The introduction and spread of these pests could spell disaster for United States food production and the economy. Handling of such refuse is regulated by the United States Department of Agriculture, Animal and Plant Health Inspection Service (APHIS) as noted below.

Special Requirements

"Garbage" regulated under these USDA APHIS rules means all waste materials acquired from outside the continental United States and Canada which are derived in whole or part from all types of produce and meat materials, and any other refuse of any type that has been associated with such materials on the vessels. This includes not only the food scraps, table refuse, and galley refuse, but the food wrappers and packaging materials too. (This also includes any other food and food packaging material from stores, food preparation areas, passengers or crews' quarters, and dining rooms.)

While on board the vessel, APHIS regulations require that all of this garbage be contained in tight, leak-proof, covered receptacles within the guard rails of the vessel. This garbage cannot be unloaded in port unless it is removed in these containers under direction of an APHIS inspector. The garbage must go into an APHIS approved facility for sterilization, incineration, or grinding into an approved sewage system (or for other handling specifically allowed by APHIS). Sterilization is accomplished by cooking the refuse at 212°F for 30 minutes, incineration involves reducing the refuse to ash, and an approved sewage system is one which keeps discharge off land, lagoons or stationary waters (e.g. one that goes into a sewage treatment plant).

APHIS inspectors have been authorized to coordinate their regulatory efforts with activities of representatives of the Environmental Protection Agency, and other Federal, State, and local agencies who also have jurisdiction over such garbage.

Ports Must Apply For Facility Approval From APHIS

Port officials or the owners of the facilities where such refuse will be accepted need to apply for the approval of their facilities. For information write to the Administrator, Animal and Plant Health Inspection Service, U.S. Department of Agriculture, WA, D.C. 20250.

Disposal Of Refuse After APHIS Required Treatment

The refuse which results from the sterilizer (also called an autoclave) (volume is reduced by about 25%) can then be disposed of in regular refuse disposal containers. The ash that results from operation of an incinerator can then also be disposed of in regular disposal containers (unless ash composition requires that it be disposed of in a landfill designated for hazardous wastes. Congress is currently considering legislation that would regulate ash disposal. Contact the department of environmental quality of your state or the EPA Hazardous and Non-Hazardous Waste Hotline (1-800-382-3000) for up to date information.)

Considerations For Choosing APHIS Reception Facilities

The capacity of the APHIS approved equipment or facility will be important for port consideration. The number of operating cycles possible per day and the volume of refuse accepted each operating cycle will determine the system's capacity.

While vessels are, under MARPOL ANNEX V, only required to keep plastics and certain other materials on board (see Table 1, p.2) the refuse returned to port will be mixed. The amount of refuse expected should be calculated with this in mind. If studies in Newport regarding the volume of refuse generated on commercial and recreational fishing vessels are any indication of refuse generation on other types of vessels, one might approximate a volume of refuse of about 4 to 6 gallons per person per day on a vessel (see Section 3B).

Notes Regarding Sterilization Facilities

All airports which receive planes from airports outside the continental United States and Canada are similarly regulated. In these airports refuse from flights is usually handled by an autoclave machine. (An international flight airport may provide helpful information.)

The Port of Seattle airport, for example, now uses a sterilizer machine which is 5' in diameter and 10' long, which they fill up to 3/4 full of refuse one to three times per day. A sterilization cycle runs about 1.5 or 2 hours and is accomplished at 250° F and 15 pounds per square inch of pressure. Fuel costs are about \$1.00 per load. About 30 minutes of labor is involved for each load for cleaning out sterilized refuse and loading an unsterilized batch. Maintenance is minimal and costs less than \$100 per year. Maintenance involves cleaning the steam trap and the steamer regularly and the door seal about once every 3 years. This type of machine costs about \$20,000, not including installation costs.

One needs to have a source of steam to run such a sterilizer. The Seattle airport uses steam from the boiler room which is used to heat the airport terminal, but must reduce the pressure of the line from 125 psi to 20 psi through a pressure reducing coupling valve. A ship's boilers could provide that source of steam. If no such source of steam exists a small boiler would need to be purchased.

Operators at the Port of Seattle airport have found that to efficiently sterilize refuse, plastic bags containing refuse must be punctured before being sterilized to allow the escapement of any liquids while the refuse is being cooked, or all the refuse will not reach the required temperature. The fewer liquids in the refuse the easier it is for the refuse to heat up.

Notes Regarding Incineration Facilities

Incinerators are commercially available for use both on land and on vessels, though their use is controversial. Concern has arisen over the pollutants (particulates, heavy metals, and complex organic molecules) that may emit from incinerators. The Environmental Protection Agency is presently reviewing regulations applying to air standards for large volume municipal incinerator facilities. For information regarding air quality standards for smaller size facilities contact the state office of environmental quality).

A small commercial sized incinerator which might prove feasible for a small port operation might be similar to the one in use on some U.S. Corps of Engineer dredging vessels. The dredging vessel, Yaquina, uses an incinerator to burn all standard refuse (no hazardous wastes). Having had trouble incinerating wet refuse, they try to divert all organic "wet" refuse from that which will be burned, by having separate receptacles in the galley. The incinerator unit measures about 3' in diameter and 5' in length, and can handle about 7 cubic feet of refuse (about 58 gallons) in each two hour cycle (a cool down period is also necessary). Diesel fuel is burned to run the incinerator. Incinerators such as these may cost about \$16,000 (not including installation) with larger capacity incinerators costing up to \$50,000.

An incinerator was in operation at the Port of Seattle airport, before their conversion to a sterilization system, in 1977. The incinerator was expensive to operate, with the fuel costs for each load of \$25.00 (1977 prices). Maintenance costs were also reported to be considerably higher. Another disadvantage of incinerator operation was seen to be the desire of other governmental agencies to use the incinerator for disposal of drugs and materials contaminated with animal or plant diseases.

Recovering Costs

To cover the acquisition costs of a \$20,000 facility in a 10 year period (given a 8% interest rate) the port should recover a total of \$242.66 a month. Operation, maintenance and depreciation costs are additional.

SECTION 4: COSTS AND COST RECOVERY

4A: CHANGES TO BE EXPECTED IN REFUSE SYSTEM COSTS

Determinants Of Refuse System Costs

The amount of additional refuse related costs will depend on numerous factors:

- how much service the port already provides (see "Interpreting and Comparing Refuse Disposal Costs" below).
- how large and busy the port is.
- how efficient the present operations are.
- if recycling is used.
- the percentage of port users already returning the regulated refuse to port.
- the labor and material resources available.
- the type and amount of facilities needed (see Section 4B).
- the availability of a municipal waste hauling and disposal system to tie into.
- the refuse disposal fees in the area.

Recovery Of Costs

Ports are permitted to recover the costs for providing refuse service to their users. Start up costs may be high for some ports but can be recovered by fees (see Section 4C) and minimized by recycling and other efficiency measures.

Interpreting & Comparing Refuse Disposal Costs

Costs to dispose of refuse from year to year will vary due to changes in refuse volumes being returned to port and changes in port useage as well as from factors unrelated to changes in the actual amount of refuse. When refuse disposal costs are assessed on the basis of volume (i.e. the size and number of refuse containers emptied each month), charges are assessed whenever a container is handled, whether full or not. Any changes in container type, hauling schedule, or worker efficiency will influence apparent volumes and hence the costs. The costs of refuse disposal at the Port of Newport are presented below.

Keeping Costs Low

Higher efficiency will result from recycling what materials you can, choosing the appropriate refuse container sizes and hauling schedules to minimize labor involvement and make sure containers are full before they are emptied. If the dumping of home refuse in port containers is a problem, the construction of refuse compounds to provide a physical and visual barrier, signs warning that such dumping is prohibited, and increased enforcement, may be of use.

Costs For Refuse Disposal Services In Newport

A privately owned refuse company operates under an exclusive franchise granted to it by the City of Newport. It is therefore the only company permitted to collect and haul refuse within city limits. Refuse is delivered to a balefill site operated by another private company. A single charge is assessed to the Port by the refuse company for the

collection, hauling, and disposal of refuse, based on the volume of the refuse containers and frequency of service. Total refuse disposal costs at the Port of Newport commercial vessel moorages, recreational marina, and shipping terminals were \$15,221 in 1986 and \$18,288 in 1987 (the year of our pilot program). Clearer understanding of these costs is had by looking at each of the dock areas separately.

At The Newport Commercial Vessel Docks (Docks serve between 200 and 800 vessels.)

Refuse service costs were \$7876 in 1986 and \$7489 in 1987. This decrease is apparent even though a large increase in refuse return has been noted, with 80% of the commercial fishermen now returning their non-degradable refuse to port. The use of recycling, worker attention to efficiency, changes in collection container type and service, and change in port use* have accounted for a 5% (\$387) decrease in refuse disposal costs during the year of the pilot program.

At The Newport Recreational Vessel Moorages (Docks and launch ramp serve up to 1300 recreation boaters a day during summer weekends.)

Refuse service at the marina cost \$5834 in 1986 and \$8381 in 1987. Between 50% and 60% of this \$2547 increase is due to an inefficient refuse hauling schedule (resulting in partially full refuse containers being hauled), with the other 40% or 50% change due to increased refuse volumes (no recycling system is in place). Marina use stayed about constant between the two years.

At The Newport Shipping Terminals (Twenty or more ships and barges served yearly.)

Refuse costs at the shipping terminals were \$1511 in 1986 and \$2418 in 1987. Refuse costs therefore increased 60% (\$907) in 1987 as compared to 1986. Use of the shipping terminals more than tripled, with fourteen more ships and barges calling in 1987 as compared to 1986, providing an explanation of the cost increase.

* There has been a 27% increase in vessel days registered in port in 1987 as compared to 1986. Since the number of fish landing records (the number of vessels delivering fish to the processing plants) have remained about constant between the years, increased days in port may indicate more bad weather days (during which vessels were forced into port or stayed tied up in port). If vessels in port were home ported vessels, more days in port might indicate less refuse, since vessels would be unoccupied, or more refuse if repair and provisioning work were being done. If vessels were from other ports, additional refuse would be expected from those fishermen staying aboard, and from any repair or provisioning work being done.

4B: REFUSE FACILITY COSTS

Determinants Of Refuse Reception Facility Costs

Refuse facility costs will depend on the type and quantity of refuse areas or containers needed, their availability, and the cost to develop and maintain these facilities or areas. Other costs are those for any equipment, material, and labor necessary to perform refuse handling tasks. (See Appendix 1 for the costs associated with improving the Newport refuse reception facilities.)

NOTE: Increased refuse storage capacity does not necessarily mean a special refuse container is required. Where fork lift trucks, hoists, trailers, barges or other equipment is available, refuse "facilities" can simply be designated space or pallets.

Sources And Costs Of Refuse Storage Containers

Refuse storage containers may be:

1. Available from a refuse company operating in the area (a rental rate may be charged, or containers may be provided as part of the refuse hauling fee)*.
2. Available from home or industrial supply businesses (see Table 4).
3. Fabricated to specification (use galvanized metal, wood, or durable plastic).
4. Adapted from existing materials and resources (such as tote boxes, shipping containers, barrels, etc.).

* A refuse company may rent or provide containers (in a variety of sizes) as a part of their refuse service agreement. Consider purchase or fabrication of sturdy, long-lasting containers if rate reductions, flexibility, or increased convenience can be had by owning the containers.

Table 4.--Sample costs of refuse storage containers.

<u>TYPE OF CONTAINER</u>	<u>APPROXIMATE COST</u>
Metal dumpsters (1 1/2 cubic yard) (galvanized to prevent rusting)	\$400
Metal self-tipping steel hoppers (1 1/2 cubic yd) galvanized	\$700-\$800
ungalvanized	\$500-\$600
Heavy plastic refuse carts (tilting) (1 1/2 cubic yard) without lid	\$700
55 gallon industrial strength plastic refuse cans with lids and rigid plastic liners	\$150-\$275
55 gallon trash cans (industrial strength) with lids but no liners (requires use of bags)	\$80-\$150
Lids for 55 gallon drums (galvanized or enameled)	\$50
Wooden fish storage totes (18 cubic feet)	\$60

4C: COST RECOVERY

Law Allows Ports To Recover Costs

Ports and docking facilities are assumed, under U.S. law, to be able to recover the costs incurred in the provision of the refuse services necessary under Annex V. While no specific mechanism for cost recovery is required, it is important to assure that in assessing fees, one is not penalizing users for their own compliance and any assistance they may be able to provide in cleaning up the ocean (e.g., fishing vessels using bottom nets often pick up large debris items). Returning refuse items to port should not be discouraged.

Recovering costs through a flat moorage rate charge, for example (assessed on a size or vessel weight basis) might be wiser than assessing a direct fee to use the refuse facilities. Costs could also be recovered through other means such as through the port operating funds, sales taxes (on common debris items), vessel licensing fees, etc. A cost recovery schedule which would have been necessary at the Port of Newport for refuse disposal services and for the changes made in the refuse reception facilities is presented below.

Recovering The Costs Of The Newport Refuse Disposal Services:

The Port of Newport moorage rate charge for the recreational and commercial vessels includes a utility fee which covers water, electrical, and garbage services. This fee is assessed at the rate of \$1.00 per day, \$15.00 per month (\$0.50 cents/day), \$42.00 for six months (\$0.23 /day), and \$84.00 per year (\$0.23/day). These fees are sufficient to cover refuse disposal costs at the recreational marina and commercial moorages (see below). Ships calling at the Port are charged a set rate (\$75/docking) for garbage service. This does not presently cover all the costs.

Port area	Vessel moorages/ launch days 1987	Refuse Disposal Costs, 1987	Fees necessary to cover costs
Recreational Marina	29,000	\$8400	\$0.29 per vessel per day
Commercial Moorages	58,000	\$7500	\$0.13 per vessel per day
Shipping Terminals*	20	\$2450	\$123/vessel

* Fishing vessels use these docks when ships aren't present, and will help defray refuse disposal costs through the utility fees they are charged. Refuse generated at the shipping terminals comes from loading operations and domestic barge traffic, since no APHIS certified sterilization facilities are yet available to receive foreign refuse. Refuse fees will need to be increased to cover this additional refuse disposal load.

Recovering The Costs For Refuse Reception Facilities:

Without a grant, the \$20,000 labor and material costs spent to improve the refuse facilities at the recreational and commercial fishing vessel moorages (see Appendix 1 for a description of the Newport refuse system changes) could have been recovered based on calculations using the following recovery schedule. A cost recovery schedule for the estimated price of a commercial sterilization facility (see Section 3D) is also included. Operation, maintenance and depreciation costs are additional.

Service provided	Costs	Pay-back period (8% interest)	Funds required per month	Funds required per day
Facility improvements	\$20,000	7 years	\$311.72	\$10.22
APHIS facility (estimated)	\$20,000	10 years	\$242.66	\$ 7.96

Fee Adjustments to Encourage Ocean Clean-up Efforts

A port might even adjust its fees to encourage compliance with ocean clean-up efforts to compensate the vessels for the extra time spent when refuse left by others is retrieved (e.g., fish nets, pallets, drums, etc.). The port could, for example:

1. Waive the fees that are normally charged to tie up to a dock and use a hoist if recovered items are off-loaded.
2. Provide a fork-lift truck to move large items at no charge.
3. Encourage the refuse company to haul retrieved refuse at reduced rates.
4. Offer a moorage rate reduction to the vessel which retrieves the most ocean debris.
5. Establish a fund (perhaps from fines assessed for littering or from donations from community members or businesses, or industry groups) to pay for disposal of retrieved items or for rewards.

SECTION 5: REFUSE SYSTEM OPERATIONS AND EVALUATION

5A: PLANS NECESSARY FOR SMOOTH REFUSE SYSTEM OPERATIONS

Management should develop an operational plan which defines the specifics of the day to day operations of the refuse system. Development of such a plan will help integrate refuse operations within the port and with outside entities, correct problems quickly, and anticipate future needs. The plan, though not necessarily formal, should present a comprehensive picture of waste handling logistics, record keeping functions, and communication requirements to all participants in the system. The plan should be sufficiently detailed to clarify what activities are required, when and who will accomplish each, and how each activity should be performed.

Though each refuse system activity may be specified distinctly, each should be explained in the context of the other refuse system activities and in the whole waste management picture. This promotes involvement of personnel, allows adaptation to real conditions, and provides for innovation, flexibility, and cooperation. The plan should be fully communicated to the workers involved and changed and clarified as necessary.

Operational Plans

Consider how the following factors will be worked into the port's operations:

- scheduling of workers for day-to-day operation of the refuse system
- acquisition of needed equipment, labor, refuse company services
- site preparation and any necessary construction and building
- maintenance of facilities and equipment
- training and motivation of personnel involved in refuse operations (see Section 5B)
- gathering of port-user comments, evaluations, and ideas
- informing port-users of the marine debris problem and the facilities and services provided
- consistent record keeping and information gathering
- evaluation of system performance—consider the frequency of and methods for the evaluations
- regular communication of information and ideas to management
- coordination of efforts and communication of information between the various port divisions, e.g. between refuse, environmental, communications, and billing staffs
- collection of fees and payments for services
- acquisition of additional, improved, or expanded facilities and services

5B: INVOLVEMENT AND MOTIVATION OF REFUSE SYSTEM EMPLOYEES

It is important that the port employees, and if possible, the workers in any outside group coordinating refuse system activities with the port, understand the concern over the marine debris issue and the role they are playing in its solution. The understanding of the complete waste management system at the port as well as the involvement of the refuse system employees in project activities will result in provision of good refuse service, helpful ideas and suggestions, and well kept records. The following undertakings may increase involvement:

1. Hold a meeting with port workers and other refuse system participants to talk about the marine debris project and the marine debris problem, to give a slide or video presentation, and to solicit their ideas.
2. Talk informally with refuse system workers about the port project and its progress. Give them information and promotional items.
3. Report back to refuse system participants, the results of studies done as part of the project, e.g. port facility evaluations, vessel impact studies.
4. Make available to refuse system employees the results of refuse system studies obtained from their records.
5. Encourage participation of personnel and their families in promotional events and activities.
6. Thank workers for their dedication and innovation.
7. Visit recycling and refuse system operations to understand them and to inform the operators about the program. Keep these participants updated on project progress when they came to the port to retrieve refuse or recyclable materials and through mailings.
8. Involve refuse and recycling company representative in the project advisory board.
9. Give each refuse system participant (within port and outside of it) promotional items such as hats, tee-shirts, sweatshirts, or coffee mugs to note their involvement.
10. Consider incentives or team building methods to encourage and motivate, e.g. money gained by recycling goes into worker fund, refuse system participants get first claim at materials returned to port, workers get recognition for good ideas or performance, or hold efficiency competitions between worker teams.

5C: EVALUATING THE PERFORMANCE OF THE IMPROVED REFUSE SYSTEM

Monitoring and evaluation of refuse system performance is important so further adjustments can be made to improve its usefulness and efficiency. Both sociological and logistical criteria are important when evaluating system performance. User acceptance and port worker acceptance of the refuse system will ultimately determine its success. Acceptance will depend on the system's convenience, ease, and comprehensiveness. Operational costs, labor intensity, and problem areas are port concerns. In order to make such evaluations it is important to establish a baseline and gather information over time.

Establish A Baseline

It is important to establish a baseline for comparison purposes. If refuse service has been provided, examination of cost records will provide baseline information. Baseline information will also result from interviews conducted at the outset of the project with refuse system workers and port users regarding labor time involvement, ease of refuse handling, functioning of refuse system, and amount of port user compliance (see Section 3A).

Monitor and Compare System Performance

If cost or refuse records already exist in some form, continue keeping similar records so comparisons can be made. Begin other records too if they could provide information useful for monitoring performance.

Management must emphasize the importance of consistent and accurate record keeping. Information relevant to evaluating performance may be:

1. the number of vessels actually in use in the port.
2. the amount of refuse generated on these vessels.
3. the total number of vessels moored in the port.
4. the amount of refuse disposed of (either by volume or by weight) in the refuse (and recycling) facilities.
5. the frequency of refuse container emptying.
6. The amount of labor involvement by port workers in refuse tasks.
7. user perception of facility convenience and service (do an initial survey (see Section 3A) and follow up surveys after facility changes and an educational campaign have been instigated).
8. worker perception of refuse system tasks and problems (survey workers initially and again after changes have been made).
9. problems with operations, equipment, overflows etc.
10. costs for refuse disposal services.

Gather Information

Analysis of baseline studies, on-going observations, and periodic surveys will provide information regarding perceptions, labor involvement, container use patterns, cost information, and problems. Additionally daily refuse records should be kept by port workers or refuse handlers. A log book or forms should be provided so that records are easily kept and easy to organize periodically (monthly, perhaps). Records should reveal number and location of refuse containers emptied, volumes of refuse and recyclables disposed of, problems encountered, and the time involvement of port workers in refuse tasks (see sample form in Appendix 4).

SECTION 6: EDUCATION AND PROMOTION

6A: CONDUCTING AN EDUCATION PROGRAM

An education program will encourage user compliance with the law and benefit a port by promoting communication, cooperation, pride, and action towards an achievable goal. It will also provide a focus for positive media attention.

An education program will create awareness and activity which will in turn change belief or behavior. In this case we must change the belief that the ocean is too vast to be seriously effected by human action and that it can assimilate the refuse thrown into it. The behavior that needs changing of course is the habit of discarding refuse at sea.

Creating A Successful Education Program

Involving others in the promotion of awareness is essential for its quick spread. Individuals who feel strongly about solving this problem can be quite influential. These people will act spontaneously to educate and involve others and will, by speaking out or setting an example, be effective motivators. Additionally, a successful education program will focus attention and thought on the marine debris issue by using varied methods to maintain a positive interest and create a reinforcing attitude.

To plan an education program suited to one's area:

1. Draw on one's understanding of the user groups and community.
2. Consider the existing levels of awareness, involvement, and environmental concern of port users. Consider the attitudes towards refuse handling, litter, recycling, and clean-up efforts. (Is there a background to build on or an attitude to challenge?)
3. Consider the levels of group organization and coherence.
4. Involve the advisory group in planning an education program (see Section 2).
5. Ask extension agents and others who work with port users for ideas on effective education measures.

To implement the education program:

1. Talk directly to mariners on the docks about the marine debris problem and get them personally involved in solving the problem and educating others. (Note: if docks are privately owned make sure to get permission before you enter).
2. Attend meetings of the user groups to explain the project and encourage support.
3. Design survey and interview questions to inform and involve as well as solicit information.
4. When talking to individuals and groups suggest specific activities that can be pursued (see Section 6C).
5. Use slide or video shows, photographic displays, and presentations to dramatize the severity of the problem and to motivate action. Put displays in places which get much public viewing such as meeting rooms, interpretive centers, libraries, post offices, schools, and supermarkets.

6. Help groups and organizations to develop and convey messages about marine debris as part of their other activities.
7. Help schools integrate marine debris information activities into existing classes and activities, e.g. classes on the environment, oceans, pollution, recycling, communications, or sociology. (see Appendix 6).
8. Write articles or provide information to: trade publications, newspapers, newsletters, magazines, and radio and television stations (see Appendix 5).
9. Post notices, articles, information, and posters in places around the port (e.g. fishing docks, fuel docks, shipping terminal, staging areas, customs, marina) as well as in marine related businesses and public places in the port and community (see Appendix 7).
10. Send out letters to port users related to the port facilities, marine debris problem and Annex V regulations.
11. Hand out and otherwise disperse brochures, notices, and promotional items.
12. Create or use signs, promotional items, and litter bags which bear project's logo and anti-debris message.
13. Use various television and radio public service announcements to educate (see ordering information in Appendix 2).
14. Sponsor "ads" on local cable television stations.
15. Use a broad-based advisory group to further the reach of information and activities within the community.
16. Acknowledge and emphasize positive accomplishments of groups and individuals in conversations and in the press, and encourage users to tell marine debris "stories".
17. Sponsor contests and events.

Preparing Effective Information

Information can change attitudes and behavior only if it is interpreted and acted upon. It will be most effective if it is seen as pertinent to one's own best interest. This is why information relayed by a respected peer is most relevant and convincing. To be effective, information should also be well presented and interesting.

Educational materials inform by word, picture, or spoken message. Some educational materials have short term validity, e.g., press releases and letters to user group members. Other materials have a longer term of use and effect and may be used repeatedly or adapted for different audiences e.g. posters, slide shows, brochures, and displays. Costs of the educational materials used in Newport are presented in Table 5. When preparing information for educational and media campaigns consider:

1. What port users need to know and want to know. For example:
 - address the effects of laws and regulations.
 - address any specific problems, fears, or concerns that arise.
 - anticipate the arguments that will be heard.
 - report accurately and fairly the concern about the environmental harm, safety and economic cost, and the persistence and quantities of debris materials in the ocean.

- emphasize the port's commitment to helping users comply with regulations by providing convenient facilities.
 - report the location and kind of facilities made available.
2. What are the self-interests of port users? Address:
 - why they should care (healthy environment, safety of mariners, repair costs to vessels, image of industry).
 - why they should comply (industry group supports compliance, easy to comply, benefits of compliance, penalties for non-compliance).
 - provide ideas on the storage, provisioning, and handling of refuse (see Appendix 8).
 3. Is information accurate, clear, concise, interesting, and understandable? (Keep writings short, use pictures, video footage, graphics, color, music, etc. wherever possible (see Appendix 7).
 4. Can information be immediately applied? (Suggest one or two specific things that can be done immediately to deal with the problem (see Section 6C).
 5. What anecdotes and stories can be related? (Stories help make a point more tangible and memorable. People like to hear stories and will be encouraged to relate their own experiences).
 6. Who can best relay the information? (Ask members of the advisory group and user groups to help inform their peers.)
 7. Does information reinforce the positive actions being taken?
 - Report to the press and to port users the progress being made, specific actions taken by individuals, stories heard, and the type and quantities of materials being returned.
 - Include comments and quotes by port users, advisory group members and port workers in press releases. (Write down notes and comments when speaking to people.)
 8. Who is the target of the information e.g., captain, crew, or both?
 9. Will the language and the medium inform the target audience? (Consider if message will reach an English speaker or not. Consider the type of materials that users read. What radio and television stations do users watch or listen to, and when?)
 10. What are the common meanings of the words used? How will what you say be perceived? (Consider what mariners are supposed to do, e.g. it might be best to emphasize retention of "plastics" rather than "garbage" where this pertains, see Table 1, p.2.)

6B: INFORMING PORT USERS WHO DO NOT LIVE IN THE VICINITY

It is more difficult to make port users who live outside the area aware of the marine debris problem because they will not be exposed to many of the newspaper articles, letters, displays, slide presentations, and may not come into contact with fellow mariners, project personnel, advisory group members or volunteers involved with the project.

It may also be more difficult to encourage their compliance with the new regulations, as they may perhaps be less influenced by the actions of people they do not know. They may feel less responsible or accountable for the effects of the debris on the local area.

In these cases the incorporation of information into meetings of mariner groups, publications read by mariners (e.g. fisheries regulations, trade newsletters, cruising guides), newspapers of state-wide distribution, and television public service announcements which reach state-wide audiences are important educational tools.

Additionally, more effort will be needed to be made to make sure that mariners will be exposed to information when they visit the area or call in port. This may mean stationing persons at popular launch ramps, docking facilities, cruise staging areas to talk to people, hand out brochures, decals, or litter bags, or to survey boaters. Mariners from the port should also be encouraged to inform visiting vessels of the port facilities. Additionally a marine debris message can be relayed to visitors when financial transactions are made (e.g. when a launching ticket, fishing license, or cruise ticket is sold).^{*} Members of customs, stevedoring operations, Coast Guard Auxiliary, fish and wildlife groups, park departments, or enforcement groups can also relay marine debris messages and information, litter bags, and promotional items during the course of their normal contacts with visitors. Signs, posters, video and photographic displays can be on view in the port and in public interest areas such as aquariums, interpretive centers, maritime museums, light houses etc. Information and brochures can be provided at tourist information centers.

^{*} e.g. "We're concerned about the dangers that plastics and other litter pose to wildlife and boaters. Would you like a free litter bag?"
("Please read this brochure"; "Please be careful with your plastics".)

6C: GETTING THE COMMUNITY INVOLVED

Why Involve the Community in Port Efforts?

Community involvement in the marine debris program will:

1. assist the port in efforts to educate port users.
2. assist the port in its investigation and consideration of a range of refuse handling options.
3. increase port and community cooperation as mariners, enforcement groups, community groups, schools, and environmental concerns work together for a common goal.
4. expand education and awareness outside of port into many homes, offices, and schools, and thus hasten progress towards long term solution of the debris problem.
5. increase the options that exist for promotional and educational activities.
6. create a feeling of ownership in the problem and generate confidence in the ability to solve problems non-adversarily.

How To Involve The Community

Community involvement is fostered by asking community members to serve on the advisory group. Involvement is also encouraged by providing ideas and resources to individuals and groups and by inviting support. Contact boating safety, law enforcement, hunting and fishing, environmental, and recycling groups, as well as service organizations and the schools. These groups can add information into their publications, presentations, and activities. It is essential to suggest ways that these groups or individuals within the group can participate. Recommend specific activities and tasks or provide a structure for this involvement. Present ideas for both limited, short-term projects as well as ones that involve a longer time commitment, or help a group brainstorm and plan projects (see below). For example:

1. Ask for volunteer support to distribute brochures or litter bags, put up posters, help with surveys, prepare displays, write articles for newsletters, develop curriculum activities, give slide or video presentations, or organize a clean-up campaign.
2. Ask volunteers, recyclers and community groups to do refuse studies and tallies, adopt a beach, river, or launch ramp, hold a contest to find ways to recycle or creatively use refuse items, or to do street theatre.
3. Ask children to create posters, public service announcements, displays, do beach studies, analyze boat refuse composition, survey stores and suppliers to see where bait and supplies are available in biodegradable packaging.
4. Organize clean-ups, contests, and events, and widely advertise them to invite participation.

Train the Volunteers

The involvement of volunteers will assure quick acceptance of the project and progress towards its goals. Make sure those individuals and groups assisting the project receive an orientation to the marine debris problem, the regulations that pertain, and the port's project. Written materials can be provided the volunteers by way of background, but it is much more effective to provide a verbal orientation and review of

information, and to show them a slide or video presentation. Such orientations will give the volunteers confidence in their ability to inform others and reemphasize the importance and urgency of their contribution to the problem's solution.

Make sure that the volunteers know what is expected of them. For example, it would be important to specify the level of detail to be noted on survey forms (e.g. "Please ask boaters to specify the amount of money or time lost due to their vessel encountering debris", "Please make sure to note all plastic items larger than a dime that are picked up on the beach"). If volunteers are to contact mariners or others, provide suggestions on how best to initiate conversations and what messages are to be relayed. Work together with the volunteers until they feel comfortable with their work.

In order to initiate conversations about the marine debris problem or port project, the following conversation starters might be suggested:

1. I'm working with the port's marine refuse project. We're trying to make people aware of the dangers that plastics cause to our marine life:
 - Have you heard about this problem?
 - Are you aware of the new law prohibiting plastic disposal at sea?
 - Would you like a brochure? (a litter bag?)
 - Would you mind answering some survey questions?
 - Have you ever had vessel problems due to plastics?
 - Did you notice much trash in the ocean today?
2. I'm working with the port's marine refuse project. We're trying to make refuse disposal easier for mariners. May I ask you a few questions?

Some basic messages that could be suggested are:

1. Plastic materials last many hundreds of years in the ocean. Every year millions of animals including marine mammals, seabirds, fish, and turtles are killed by entangling in or ingesting debris items.
2. Marine debris endangers the livelihood and safety of mariners when it fouls propellers or engine intakes, resulting in tows, loss of maneuverability, and lost operational time.
3. A new law now prohibits mariners in the United States and 26 other nations from disposing of all plastic materials into the ocean (and certain other materials as well).
4. Please keep all plastic trash on board (Please don't litter). Dispose of refuse properly when you return to shore (When you leave the beach). Make sure the proper people know if refuse receptacles are unavailable or inadequate.

Brainstorming To Generate Ideas

If a group wants to design its own marine debris activities one might facilitate a brainstorming game to help them generate ideas. These ideas can later be refined and prioritized. The objectives and rules of brainstorming are simple:

Objective: To generate as many ideas as possible in an allotted amount of time (no more than 10 minutes). (Write the ideas down as they are mentioned where everyone can see.)

Rationale: The more ideas gathered, the better are the chances for having a good idea.

Rules (make sure no one cheats):

Defer judgements

(Absolutely no criticism allowed, no "can'ts", "won'ts", or "buts" allowed— discussion comes later).

Throw as many ideas on the table as possible.

(The crazier and more creative the better— other ideas will be sparked).

Tag on

(Make another idea out of the last one given by changing it in some way).

6D: ENCOURAGING MEDIA ATTENTION

Newspapers, magazines, trade publications, educational publications, and radio and television can help inform port users and other community members about the marine debris problem and about the steps being taken to solve it. Media coverage can thus play a significant role in affecting perceptions about the marine debris problem and about the port and its user groups. The more media coverage received and the more varied that coverage is (in terms of both subject matter and the medium of the message), the more likely it is that the community will be aware of the port project.

Promoting Media Coverage

The amount of coverage given to a project is often related to the amount of time and energy that is put into communications with the media. It is necessary to write press releases and to otherwise encourage media coverage. It is important to establish good relations with the media and keep them informed of project activities. It is also important to pay attention to media schedules, deadlines, and formats. You may find that:

1. Newspapers often have a format that they like followed for their press releases, e.g. must be double spaced, give a contact name, bear a title and date, etc.
2. The likelihood of written press coverage is increased if one submits press releases with black and white photographs and graphics, for example the project logo.
3. Press coverage may be increased by including additional information such as fact sheets.
4. Photographs are more likely to be used if they: feature a few people rather than a large group, clearly illustrate a topic, convey a striking message, convey a positive message, or are novel.
5. Information that is locally relevant is more likely to be used.
6. Results of surveys and evaluations which can be quantified numerically will be of interest (e.g. 50% of ...).
7. Visiting editors and producers to introduce the project's goals is productive.
8. Calling the press to inform them of events and photo opportunities will increase the likelihood of coverage.
9. Writing stories that focus on the constructive changes happening and quoting community members and port users will increase the chance of coverage and will build community support.
10. Trade organizations, Extension/Sea Grant Programs, schools, and many agencies and service organizations have in-house and external publications as well as writers who can help publicize information that is provided to them.

Topics Of Interest To Press

All efforts to accomplish the marine debris project's goals will be potentially interesting to the press. As activities are pursued, take photographs (people pictures, before and after pictures, etc.) or notify the press of photo opportunities. Quantify information, keep track of the number of people attending events, write down quotes etc., for use in press releases. Provide information in the following interest areas:

On the marine debris problem:

- quantities of plastic on local beaches.
- effects of plastic on wildlife.
- costs associated with debris damage to vessels.
- safety problems associated with debris.

On the pilot project:

- hiring of manager of project
- start-up and purpose of project
- advisory group membership
- refuse facility changes
- presentations, displays, and other educational efforts

On user group or community support and progress

- actions taken by the port users to solve the problem
- community member involvement
- promotional materials prepared by community groups, schools
- activities undertaken by groups and schools
- beach clean-up activities and results
- promotional events and contests
- changes in refuse disposal behavior
- changes in quantities of refuse returned to port or found on beaches

6E: USING PROMOTIONAL MATERIALS

Promotional materials help draw attention to the project, spreading and reinforcing a marine debris message. Promotional items can bear the project's logo and message and might use a characteristic color to enhance identification.

Some promotional items can be made or obtained inexpensively. Some items can be sold for cost or used as a fund raising tool. Other materials can be budgeted for or may be able to be produced or obtained in collaboration with port user groups, federal state, county, and local agencies, and private groups. In the state of Washington, for example, a task force involving various agencies and private groups has been formed to cooperatively plan efforts and assure state-wide consistency (for information, contact Bob Rose, Washington Department of Natural Resources, 1100 Olive Way, Suite 1450, Seattle, WA 98101, 206-464-6416).

Examples of promotional materials used in Newport and their costs are found in Table 5. The resource lists in Appendix 2 provide information on the costs and availability of these items and others. The Center for Environmental Education has set up a clearing house for information about the availability, sources and prices of other marine debris materials (see address in Appendix 2).

Distributing Promotional Items

Though some phone and mail requests for promotional materials will come from other areas, most materials will be distributed within the local area. Advisory group members, port user group members, and volunteers can be asked to distribute decals and stickers to mariners and post posters. Items can be left on counters in marine supply stores and in places where fishing licenses are sold. Promotional items can also be distributed from the port and project offices. Materials can be given to participants and children at events and presentations. Hats and sweatshirts can be distributed or sold from the port or through the user group offices. Dispensers can be built for litter bags and placed at launch ramps or offices, or litter bags can be handed to mariners by members of the port or boating safety and enforcement agents (see below).

Using Litter Bags

The distribution of plastic litter bags to vessels was debated in Newport. It seemed ironic to be handing someone a plastic bag to bring back their plastic refuse with. It was decided that the more important message was not that plastics shouldn't be used at all, but that when they were used they needed to be handled properly. We chose the litter bag design so that it would promote reuse. Bags were of double thickness and had a cotton drawstring. Each bag was printed with useful navigation and safety information on one side, and a marine debris message on the other side. Additionally, text printed on the bag read: "Empty this bag in the next convenient trash or marine receptacle. REMEMBER TO REUSE THIS BAG".

The marine patrol members of the sheriffs and state police found that dispersing litter bags to boaters on the water was an excellent public relations device, and one which allowed them to approach the vessels in a non-confrontational manner.

Budgeting For Educational and Promotional Materials

Without a grant the \$13,000 spent for the educational and promotional materials in Newport could have been recovered or budgeted for as below:

Costs	Pay-back Period <u>(8% interest)</u>	Funds required <u>per month</u>	Funds required <u>per day</u>
\$13,000	3 years	\$407.37	\$13.36

Table 5.--The approximate costs of some educational and promotional materials used in Newport.

<u>Item</u>	<u>Quantity</u>	<u>Cost</u>
Brochures	10,000	\$ 2100
Posters	5,000	\$ 500
Decals	6,000	\$ 900
Coloring Books	3,000	\$ 1000
Stickers	20,000	\$ 450
Signs (wood)	20	\$ 800
Litter bags	8,000	\$ 1400
Litter bags (beach clean up)	2,000	free
Slide shows	5	\$ 250
Photo-displays	9	\$ 1000
Sweatshirts	288	\$ 2200
Hats	432	\$ 1100
Notices	40	\$ 25
Video-taped programs (copies)	4	\$ 200
Radio PSAs (copies, 7 announcements)	25	\$ 250
TV PSAs (copies)	6	\$ 200
Advertisements, newspaper	2	\$ 350
Advertisements, tv	2 weeks	\$ 200
		<hr/>
		\$ 12,925

Note: Additional costs (about \$2500) were involved in the development of the tv and radio public service announcements and brochures and for the acquisition of the rights to some art and photographic materials.

6F: USING PHOTOGRAPHIC MATERIALS

Photographs (or tv or video footage) relay powerfully the serious and tragic effects of the marine debris problem. Photographs of entangled animals, vessels damaged by debris, and refuse washed up on local beaches can often emphasize the reality of the problems and make impressions that written words cannot. Local or regional pictures are best, but not critical.

Photographs can also serve as a way to emphasize the positive accomplishments and efforts taken to solve the marine debris problem, which may encourage more participation, a sense of progress, and a feeling of community pride. Images of a ship offloading bags of trash, a boater saving an entangled duck, fishermen using the port's improved refuse containers, members of the advisory group involved in promotional activities, and the participants in beach clean-up efforts, will be important for press articles (see Section 6D).

Where and How to Use Photographs

Photographs can appear on notices, letters, posters, be submitted with news releases, or be organized into displays. For news releases and for other printed or copied information, glossy black and white photographs or clear black and white reproductions are best. Some color photographs can also reproduce well in black and white.

Source of Photographic Materials

Besides the photographs you can take yourself, photographs of the effects of marine debris can be acquired by borrowing or purchasing the slide programs available from Natural Resources Consultants, the Center for Environmental Education, or the National Marine Fisheries Service Marine Entanglement Research Program (addresses listed in Appendix 2) and having such slides reproduced into photographs. Colored slides can be printed in either color or black and white. Additional sources of photographic materials may be the state's fish and wildlife agency, aquariums, fishing and hunting or environmental groups, the Coast Guard, and boating organizations.

Preparing Photographic Displays

Photographic displays are self-explanatory and effective educational tools. Though it takes time to prepare such a display, the displays can then be exhibited in many places and reach many people. The preparation of a photographic display is a defined and limited project and as such lends itself to volunteer individuals or groups who want to aid port efforts.

In Newport, a low cost method of preparing photographic displays was found. Photographs of impacted animals and vessels were printed (in at least 8" x 10" size, also some poster-sized photographs were produced). These photographs as well as project posters, notices, and the text for the photographs (text was written on a personal computer which had a graphics/lettering program, printed and cut out to size, and adhered to colored poster-board to provide rigidity and a border) were laminated for protection and durability. These laminated materials were not mounted onto any backing, rather small, self sticking Velcro pieces (the rough side) were adhered to the back of the laminated materials. These velcro pieces will allow the items to stick to a material display board or to any piece of felt or nappy material that is suspended as a backdrop (test material for adherence with the velcro before purchase).

APPENDICES

APPENDIX 1: PORT OF NEWPORT REFUSE RECEPTION SYSTEM

The surveys, observations, and investigations conducted at the Port of Newport to evaluate refuse reception needs indicated some improvements were required in the refuse reception systems at each of the port areas— the shipping terminals, the commercial fishing vessel moorages, and the recreational vessel marina. The changes made at the commercial fishing moorages and marina are explained below and summarized in Tables 6 and 7 and by Diagrams 1 and 2. The costs of the facility improvements totaled about \$20,000 (see Table 8). A list of problems encountered at the port (both dealing with refuse needs and attitudes) is also presented. Facilities to sterilize or incinerate refuse from vessels with foreign ports of call, have not yet been established at the shipping terminals. An investigation of these Animal and Plant Health Inspection Service (APHIS) requirements was undertaken (see Section 3D).

At the recreational vessel marina and at the moorages serving commercial fishing vessels changes were made to provide mariners with refuse reception facilities which are more convenient, ample, and comprehensive (see Diagrams 1 and 2). Refuse reception capacity for the commercial fishing vessels was increased by establishing areas for refuse adjacent to a dock where a hoist was available and on a barge (see Diagram 2 D,E). Additional refuse reception capacity also resulted from increases in the size or number of containers available to the recreational and commercial vessels on land-accessed docks (Diagram 2B), at the head of each of the ramps providing access to floating docks (Diagrams 1A and 2A), and on the boat launch ramp (1B). Windscreens and compounds were built around the refuse containers at the access and launch ramps (1 A,B and 2A) to make the facilities less visible and less accessible so as to discourage the disposal of home generated refuse and maintain the aesthetic qualities of the waterfront. Refuse disposal facilities are completely accessible to mariners however, and are located as close to the vessels as possible while still allowing the access of the equipment needed to empty them.

Use of larger refuse containers at the recreational marina allowed the port to reduce the time required to handle refuse by about half and take better advantage of refuse company services. Changes in the refuse system at the commercial moorages also reduced the port labor required to handle refuse containers by half, allowing expansion of worker duties into recycling tasks. Recycling bins or space for fishermen to put recyclables have been made available on the barge (2D), adjacent to the refuse containers (2A), and in the hoist dock area (2E) for use by the fishermen.

These recycling facilities accept items of net, line, cable, wood, metal, and cardboard. It is estimated that the port's capacity to receive plastic refuse has been increased by at least a third by having these large volume items diverted from the refuse containers. As mariners, recyclers, residents, and tourists find these collected materials desirable, they remove them from the port at no charge, resulting in decreased solid waste disposal costs. A small amount of revenue is even generated by the sale of the unwanted metal items. This recycling system has therefore allowed and encouraged vessels to conveniently dispose of a full range of waste materials.

Table 6.--Recreational marina vessel refuse reception system (see Diagram 1 on the next page for a map of Newport Marina).

<u>AT START OF PROJECT</u>	<u>AT PRESENT</u>
LOCATION	
on each access ramp (A)	same
on launch ramp (B)	same
NUMBER OF CONTAINERS	
10	same
CONTAINER TYPE/ STORAGE CAPACITY	
garage cans	dumpsters
50 gallon	324 gallon
	(1 1/2 cubic yard)
TOTAL REFUSE CAPACITY	
500 gallons	3240 gallons
OTHER REFUSE STORAGE CAPACITY	
20 cubic yard drop box (C)	drop box eliminated
	cardboard storage
	area (D).
HANDLING REQUIREMENTS	
Check containers, remove full plastic bags, insert new bags, transport full bags in pick-up to drop box (C), unload bags into drop box, refuse company empties drop box when full.	Check containers, exchange positions of dumpsters to maintain capacity in high use areas, refuse company empties full dumpsters at docks. Cardboard from marina store is collected.
TIME REQUIREMENTS (hours/day)*	
October-May: 0.5 - 1.5	.25 - .75
June-September: 3.0 - 4.0	** 1.0 - 2.0

* Time includes all the refuse handling tasks at the recreational marina. This includes the time to empty refuse from rest rooms, marina store, fish cleaning areas (emptied into different storage container), and to resupply restrooms. Since there were no changes made in these operations, the time difference between years reflects changes in the vessel refuse handling system.

** estimated time involvement for summer 1988.

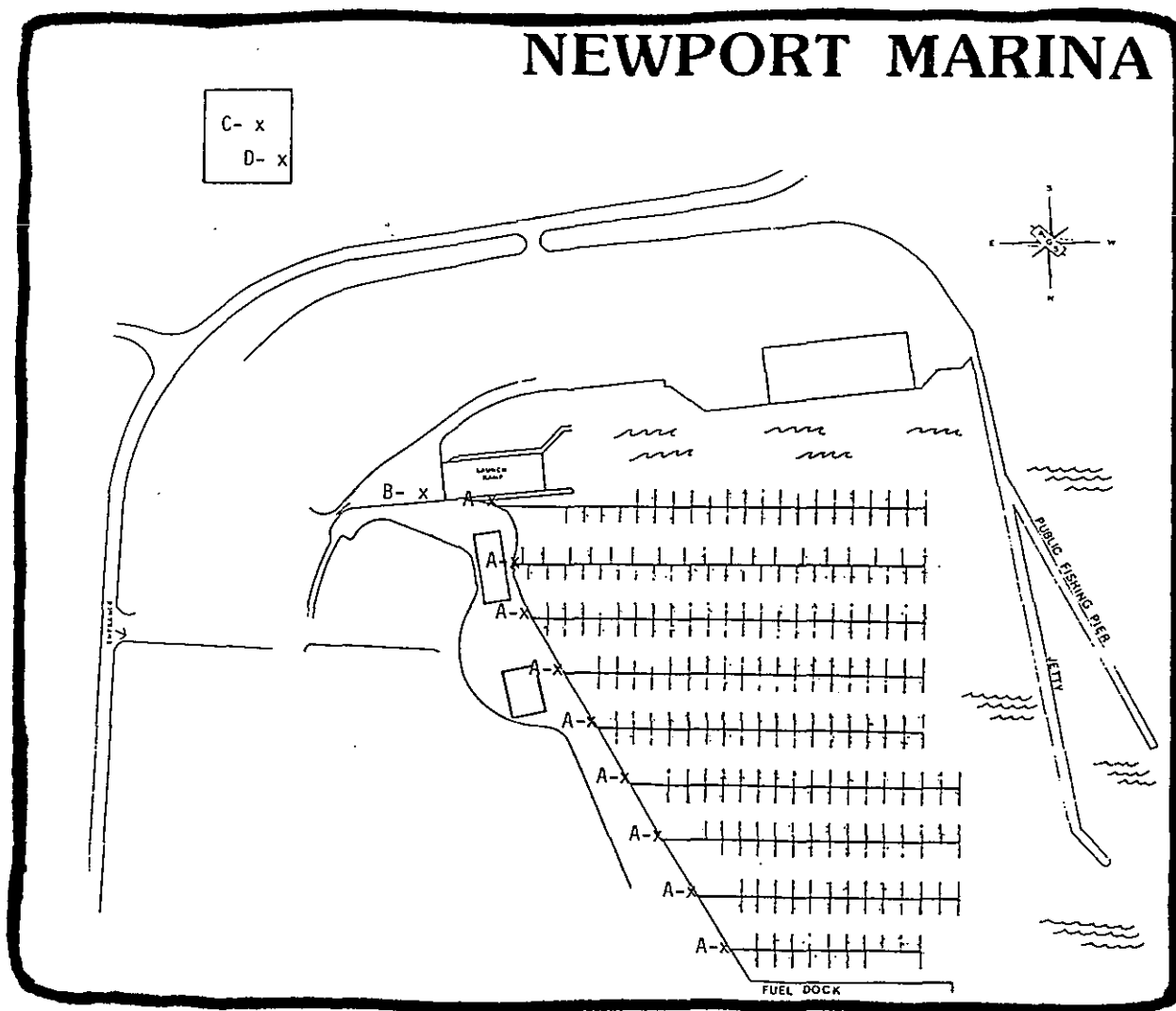
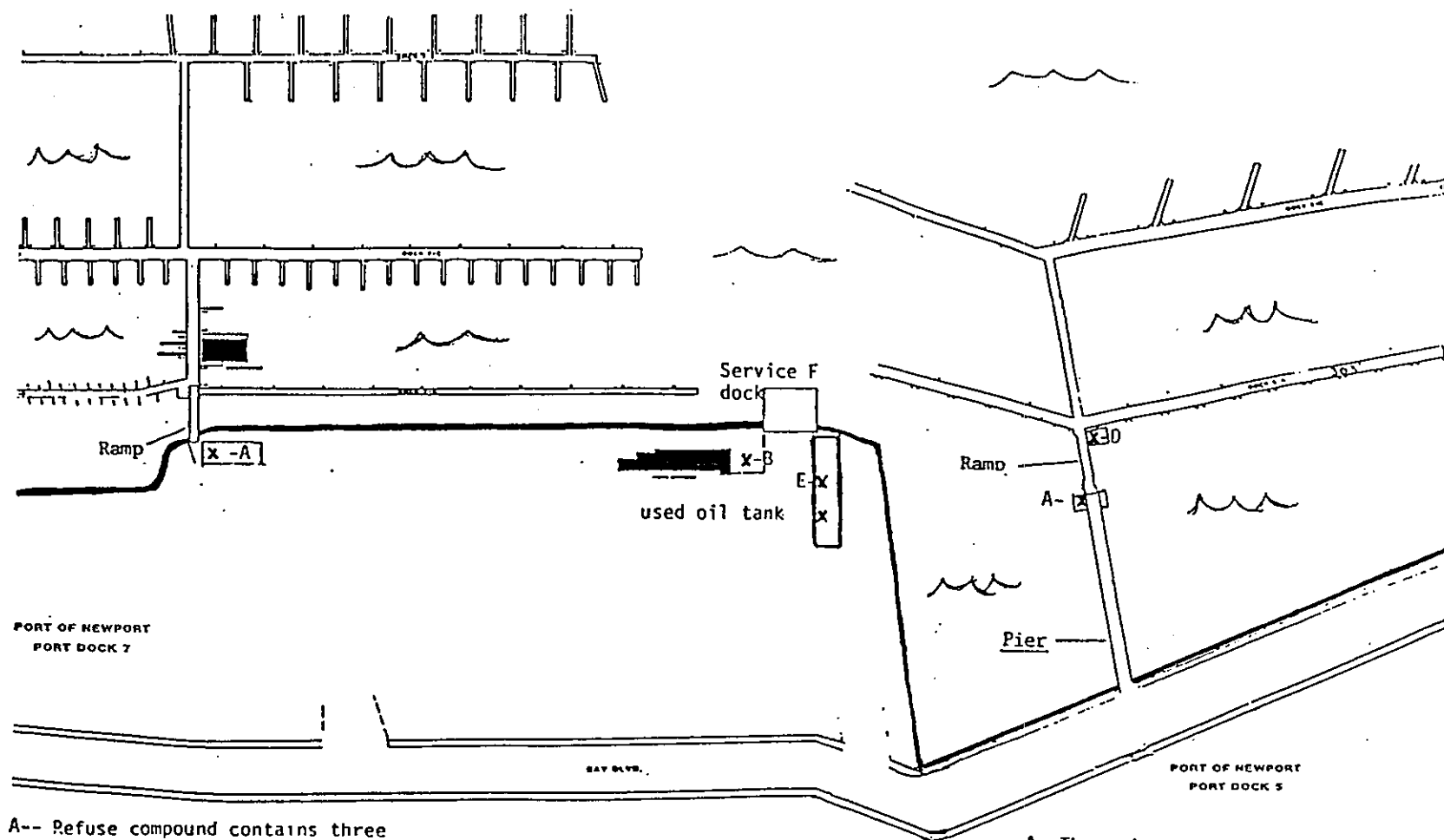


Diagram 1.--Recreational marina refuse reception system. A, B = 50 gallon refuse cans replaced by 1½ cubic yard dumpsters; C = 20 cubic yard drop box; D = shed for cardboard.

Table 7.--Commercial vessel refuse reception system (see Diagram 2 on the next page for a map of Port of Newport, docks 5 and 7.

<u>AT START OF PROJECT</u>	<u>AT PRESENT</u>
LOCATION	
on each access ramp (A)	same
on fixed dock (B)	same
near public road (C)	eliminated
	water level barge (D)
CONTAINER TYPE/CAPACITY/ NUMBER	
5 dumpsters (1 1/2 cubic yd)	13 dumpsters (1 1/2 cubic yd)
1 20 yard drop box	8 tote boxes* (2 cubic yds)
	2 bins* (5 cubic yds)
	(* for recyclable refuse material)
CONTAINER STORAGE CAPACITY	
30 cubic yards	47 cubic yards
OTHER REFUSE STORAGE CAPACITY	
old gear, nets accepted as needed	refuse reception area (E) designated for nets,cable, metal,wood,line.
HANDLING REQUIREMENTS	
Full dumpsters transported by fork lift to 20 yard container, another, larger fork lift used to empty dumpsters into container. Empty dumpsters transported back to dock area. Refuse company empties 20 yd container when full	Full dumpsters transported by fork lift to the central collection area (E) to be emptied by refuse company and empty dumpster from extra supply brought to dock areas. Containers of recyclables transported by fork lift to area (E) and emptied or barge towed to service dock (F) & unloaded using hoist. Containers, barge returned to place.
TIME REQUIREMENTS	
15-20 minutes/dumpster handled	5-10 minutes/dumpster handled. 8 hours/month for recycling tasks.
OTHER CHARACTERISTICS	
waste oil reception tank (G)	Tank (G) plus two additional waste oil recepticals at (A). Refuse containers hidden and sheltered by wind screens or compounds (H + I). Dock widened in refuse reception area (J).



A-- Refuse compound contains three dumpsters, cardboard, metal, wood recycling bin, used-oil recepticle

B-- One 1½ cubic yard dumpster

E-- Storage and recycling area contains extra empty dumpsters, receives full dumpsters, has trailer designated for wood, bins for cardboard, metal, line, has area designated for nets and cable

G-- Used oil tank

A--Three dumpsters, one cardboard recycling bin, one used-oil recepticle
Pier widened in recepticle area
Fork-lift moves recepticles

D- Water-level barge has space and bins to accept recyclable items nets, metal, and wood.

Diagram 2 - Commercial Moorages Refuse Reception System

Table 8.--Costs of refuse reception facilities.

CONTAINER COSTS-- RENTAL

The one and one half cubic yard refuse dumpsters initially in use in Newport were rented by the refuse disposal company.

Rent is assessed at a price per pick-up of \$ 2/pick-up

20 cubic yard container rental fee assessed at a rate of about \$1.50 per day

\$ 48/month

CONTAINER COSTS-- PURCHASE.

20 galvanized dumpsters (1 1/2 cubic yard) were later purchased purchased from a metal fabricator. 20 dumpsters @ \$375=

\$7500.

Refuse recycling bins for cardboard, wood, metal, and net materials) were made from available, used wooden boxes (used by fish companies to store fish and ice). These boxes (4' x 4' x 3') were painted, and lids put on those designated for cardboard. 6 bins donated, other 6 obtained for \$15-\$25 each =

\$ 100.

Two storage drums (heavy galvanized steel drums with emptying spigot and lift -off metal lid) were acquired from a state surplus program and adapted to store used oil by rewelding them and sealing them with an epoxy compound=

\$ 100.

FACILITY DEVELOPMENT COSTS

Area was cleared adjacent to a docking area where a hoist was available to create refuse reception capacity. Pallets, bins, and a trailer were painted and designated by signs for the reception of various refuse items

\$ 1380.

Material- signs, paint, trailer railings \$300.

Labor (90 hours)- \$1080.

Two refuse compounds were built at the commercial vessel moorages, windscreened areas built to house dumpsters at the recreational marina

\$10,218.

Material- windcreens, cement pads, \$1200.

Material- refuse compounds, cement floor \$4218.

Labor (80 hours)- wind screens, pads \$ 960.

Labor (340 hours)-refuse compounds, floor \$3840.

An old port barge was adapted to accept refuse materials by adding more flotation, railings, paint, and a sign

\$ 500.

A heavy-duty metal "tote-picker" (an L-shaped piece of metal), was fabricated to be lowered by hoist to retrieve the totes of recyclable materials placed on the barge.

\$ 50.

Rakes, brooms, chains and locks (for locking refuse containers to docks) were purchased.

\$ 50.

TOTAL COSTS

\$19898

Newport's Marine Refuse Disposal Project

REFUSE SERVICE/ FACILITIES

PROBLEM ENCOUNTERED	SOLUTION FOUND
Home trash in dumpsters.	Moved dumpsters to less accessible location. Constructed compounds and wind screens
Overflowing refuse containers.	More attention paid by port personnel to emptying or providing empty dumpsters. Provided larger volume containers. Recycling containers provided near refuse containers.
No place to dispose of nets.	Area designated to receive nets adjacent to dock with hoist. Water level barge for receiving nets provided.
Large items too heavy to carry off docks.	Water level barge provided. Port lets vessel know they will provide assistance as necessary.
Keeping up with refuse load labor intensive.	Increased capacity of refuse containers. Had refuse company pick-up refuse without port involvement where possible. Automated recyclable material pick-up where possible.
High refuse costs.	Involved port workers in attaining higher efficiency. Made sure containers emptied only when full. Encouraged recycling of materials.

Newport's Marine Refuse Disposal Project
EDUCATION

PROBLEM ENCOUNTERED

SOLUTION FOUND

Hostility to more regulations.

Emphasized high costs and danger posed by debris to vessels.

Emphasized that ending problem depended on voluntary compliance.

Asked for user ideas on how they would go about solving problem.

Asked how port could make it easier for them to comply & tried to respond to suggestions.

Hostility to being singled out as targets of marine debris efforts when their industry alone not largest source of problem.

Emphasized that all industry groups were being approached.

Acknowledged that their group was not only group responsible.

Difficulty in reaching the many recreational fishermen who come from out of town.

Educational signs hung in strategic locations.

Litter bags and marine debris message offered to boaters by port, boating safety and enforcement workers.

Need for long term solution.

Involved school & community groups.

Encouraged use of degradable packaging and food storage containers.

Encouraged recycling/awareness of waste management concerns.

Need for educating many people
in short time period.

Formed broad-based advisory group.

Made presentations to groups.

Involved users in expanding
awareness of peers.

Used radio and tv public service
announcements & cable tv messages.

Used many promotional items and
wrote many articles for the
newspapers.

Lack of interest in project/program.

Showed own enthusiasm and concern
about problem.

Praised and spotlighted positive
actions being taken and showed
what local persons were doing.

Made activities fun.

Used promotional materials
(project logo designed by local
fisherman).

Sponsored a contest to design
convenient waste receptacle
(a prize of \$100 was not enough to
encourage a large number of entries).

Featured local examples of
debris problems (on vessels
and animals) to create a sense
of immediacy and relevance.

APPENDIX 2: MARINE DEBRIS RESOURCES

Order Forms for Start-up Materials.....	66,67
Written information.....	68,69
Clearing House--Marine Debris, Beach Clean-up Information.....	68
Video Programs/Slide Programs.....	70,71
Photographic Displays.....	71
Brochures.....	71
Public Service Announcements (PSAs for newspaper, radio and TV).....	72
Posters.....	73
Decals, Stickers, Bumper Stickers.....	73
Coloring Books.....	74
Plaques for Fishing Vessels.....	74
Logo and Caption.....	74
Price Lists for Printed Material, Brochures, and Radio PSAs.....	75-79
Script of TV Public Service Announcements.....	80-83

ORDER FORMS FOR START-UP RESOURCE MATERIALS

For a further description of the items listed refer to the information in the attached resource list.

Jim Coe, Marine Entanglement Program/National Marine Fisheries Service
7600 Sand Point Way NE, Bin C15700, Seattle, WA 98115

Please send me a copy of the reports checked below.

_____ "Report on a Port Based Project To Reduce Marine Debris" (13 page report).

_____ "Dealing with Annex V- Resource Guide For Ports" .

Thank-you.

Name: _____

Address: _____

Phone: _____

Natural Resources Consultants, 4055 21st Ave West, Seattle, WA 98199

Please send me the materials indicated below.

_____ "The Growing Problem of Marine Debris" (13 page report).

_____ Fact sheet on Marine Debris

_____ "Our Ocean Is Drowning" posters. I could use _____ posters.

_____ "Stow It" stickers I could use _____ stickers.

Thank you.

Name: _____

Address: _____

Phone: _____

Westcom Productions, Attention: Customer Service
1925 Bailey Hill Road
Eugene, OR 97405

Please send me _____ copies of the 9 minute video tape called the "Port of Newport, Marine Refuse Disposal Project ". I have enclosed a check or money order for \$8.00 to cover the cost of each tape ordered and the postage and handling. Thank you.

Name: _____

Address: _____

Phone: _____

National Audio Visual Center, Attention: Customer services
8700 Edgeworth Drive, Capitol Heights, Maryland 20743-3701

Please send me _____ copies of the 8 minute (circle one) VHS or BETA video tape from the National Marine Fisheries Service called "Trashing The Oceans".

_____ I have enclosed a check or money order for \$35.00 to cover the cost of each tape ordered and the postage and handling.

_____ Please bill me. Purchase order number _____. I understand there is a \$5.00 billing charge, so the price will be \$40.00.

Thank you.

Name: _____

Address: _____

_____ Phone: _____

Above video is also available, free, for loan, and by Visa or Mastercard phone orders. See attached resource list.

Tom Gentle
OSU Extension/Sea Grant Program
Oregon State University, Agricultural Communications Department,
Corvallis, OR 97331

Please send me _____ copies of the set of four television public service announcements about marine debris. I have enclosed a check or money order to cover the cost of the tapes wanted (as indicated below). I understand this price includes the postage and handling as well.

_____ \$15.00 for each copy on 3/4 inch tape stock.

_____ \$28.00 for each copy on 1 inch tape stock.

Thank you.

Name: _____

Address: _____

_____ Phone: _____

WRITTEN INFORMATION

- * "Report on a Port Based Project To Reduce Marine Debris"
 - * "Dealing with Annex V- Resource Guide For Ports" (also see "video footage" below).
- Both from: Jim Coe, Marine Entanglement Program/National Marine Fisheries Service, 7600 Sand Point Way NE, Bin C15700, Seattle, WA 98115.

- - -

- * "The Growing Problem of Marine Debris", 13p. free
 - * Fact sheet on Marine Debris
- Both from: Natural Resources Consultants, 4055 21st Ave West, Seattle, WA 98199, 206-285-3480.

- - -

- * "Citizen's Guide to Marine Debris", informative guide on the issue with suggested activities on how to help. \$2.50 for postage and handling.
 - * "Plastics in the Ocean, More Than A Litter Problem", 128 page report on the marine debris problem and its effects, funded by the Environmental Protection Agency. \$8.95.
 - * "A Special Report, Plastics in the Ocean" 4p.
 - * "Entanglement Network Newsletter", current information on legislative developments, research, and activities.
- All from: Center for Environmental Education, 1725 DeSales St, NW, Suite 500, Washington, D.C. 20036, 202-429-5609.

- - -

- * "Nuts and Bolts Guide To Organizing Beach Clean-Up"
- From: Judie Neilson, Oregon Department of Fish and Wildlife
PO Box 59, Portland, OR 97207, 503-229-5406.

- - -

- * Curriculum Materials
- Contact: Vicki Osis, Hatfield Marine Science Center, Newport, OR 97365.
503-867-3011.

- - -

- * INFORMATION CLEARING HOUSE & BEACH CLEAN-UP DATA BASE

THE CENTER FOR ENVIRONMENTAL EDUCATION HAS SET UP A CLEARING HOUSE FOR MARINE DEBRIS INFORMATION AND MATERIALS. THEY ALSO ARE CREATING A COMPUTERIZED DATA BASE FOR BEACH CLEAN-UP INFORMATION (Use standard form provided in Appendix 5 for beach clean-ups.) Send in information about your marine debris activities, copies of reports, materials developed, etc.

Contact: Kathy O'Hara, Center for Environmental Education
1725 DeSales St, NW, Suite 500, Washington, D.C. 20036,
202-429-5609.

* General Interest Articles on Marine Debris

- Time, August 1, 1988 (p.44)
- Newsweek, August 1, 1988
- Western Outdoors, August 1988
- Smithsonian, March 1988 (p.59)
- National Fisherman, February 1988 (p.20)
January 1987 (p.5)
- Business Week, October 12, 1987 (p.88)
- Sea Technology, October 1987 (p.81)
- Newsweek, July 27, 1987 (p.50)
- U.S. News and World Report, July 6 1987 (p.72)
- Defenders, May/June 1987 (p.30)
November/December 1986 (p.16)
- Audubon, May 1987
September 1986, (p.18)
- International Wildlife, September/October 1986 (p.29)
May/June 1986 (p.22)
- Time, June 2, 1986 (p.70)
- Oceans, May/June 1986 (p.66)
- Environment, July/August 1985 (p.24)
March 1985 (p.24)
- Sierra, July, August 1985 (p.13)
- Oceanus, Winter 1984,1985 (p.65)
- Natural History, Fall 1983 (p.20)
- Science Digest, July 1983 (p.23)

VIDEO PROGRAMS/SLIDE PROGRAMS

- * "Marine Refuse Disposal Project" (9 minute video)--- about the pilot program at the Port of Newport in Oregon, related to facility development and education produced by NOAA/National Marine Fisheries Service in cooperation with the fishing industry, and the Oregon State University Extension/Sea Grant program.

From: Westcom Productions, Customer Service, 1925 Bailey Hill Road, Eugene, OR 97405. Send check or money order for \$8 (includes postage and handling). Specify "Port of Newport, Marine Refuse Disposal Project".

(For orders of more than five copies, copies are available for \$5.50 each plus postage and handling. Call customer service, 503-683-2236 for shipping costs, and then send a check or money order for full amount to above address.)

- - -

- * "Trashing the Ocean" (8 minute international maritime award winning documentary video)- about the marine debris problem and its effects.

Produced by NOAA/National Marine Fisheries Service:

For purchase from: National Audio Visual Center, Attention:

Customer Services 8700 Edgeworth Drive, Capitol Heights, Maryland 20743-3701, 301-763-1896. Send a check or money order for \$35.00 for a VHS or BETA videotape. (To be billed, a purchase order number or official letter is required, and an additional \$5.00 charge will be added). For a visa or mastercard order, call 1-800-638-1300. Specify NMFS video called "Trashing the Oceans".

A 3/4" tape is also available for \$80.00

For loan from: Modern Talking Pictures Service, 6000 Park St. North, St. Petersburg, Florida 33709, 813-541-7571. Specify NMFS video called "Trashing the Oceans", and if you want a VHS or BETA videotape.

Slide show similar to above video for loan from: Natural Resources Consultants, 4055 21st Ave W., Seattle, WA. 98199

- - -

- * Marine debris program for school age children (7 minute video) similar to "Trashing the Oceans" video above.

From: Bookstore, Hatfield Marine Science Center

Newport, Oregon 97365, 503-867-3011. Send check or money order for \$16.00 (includes postage and handling). Curriculum materials are included.

- - -

- * Slide program (10 minutes) related to marine debris and entanglement. \$25.00.

From: Center for Environmental Education, 1725 DeSales St, NW, Suite 500, Washington, D.C. 20036, 202-429-5609.

VIDEO PROGRAMS continued

- * Instructional video on marine debris and refuse handling for commercial fishermen (especially trawlers and gillnetters).

From: Natural Resources Consultants, 4055 21st Ave West, Seattle, WA.
98199, 206-285-3480.

- - -

- * "Plastics are a Different Kind of Trash" - a 6 minute video (comes with 4 briefing sheets) for oil and gas industry workers.

From: Center for Environmental Education, 1725 DeSales St, NW, Suite 500,
Washington, D.C. 20036, 202-429-5609.

- - -

- * "Get the Drift" (12 minute video) re: First beach clean-up (held in Oregon in 1984).

For loan from: Ginny Goblirsch, Oregon State University Extension/Sea
Grant Program, 29 SE 2nd, Newport, OR 97365, (503-265-6611 ext.207).

PHOTOGRAPHIC DISPLAYS

- * Graphic displays of animal entanglement in marine debris. For short term loan only. (Use of all photographs would fill a 4' x 8' display area. Photographs are velcro backed for use on material display boards.)

From: Ginny Goblirsch, Oregon State University Extension/Sea Grant
Program, 29 SE 2nd, Newport, OR 97365, 503-265-6611 ext.207.

BROCHURES

- * For sports and commercial fishermen and general audiences, four color. Photocopy and price list attached.

From: The Lasting Impressions, PO Box 8, Newport, OR 97365, 503-265-8535,

- - -

- * Four separate eight panel brochures for commercial fishing, recreational boating, merchant shipping, plastics industry, or petroleum industry audiences.

From: Center for Environmental Education, 1725 DeSales St., NW, Suite
500, Washington, D.C. 20036, 202-429-5609.

- - -

- * For North Pacific Fishermen

From: Natural Resources Consultants, 4055 21st Ave West, Seattle, WA
98199, 206-285-3480.

PUBLIC SERVICE ANNOUNCEMENTS

NOTE: As a courtesy, newspapers and trade journals will often print written public service announcements and television and radio stations often will play public service announcements. Call or visit the station or office and ask for the public service director. Explain the marine debris issue and ask if their company would assist in this public education campaign. For radio and television announcements, ask the station to tape these announcements onto their own tape stock and return your copy for distribution elsewhere. TV stations can work off either a 3/4 inch or a 1 inch tape. You might want to use all of the announcements, or pick those of the series which best suit your area.

* TV Public Service Announcements

A set of four 30 second public service announcements
3/4 inch copy \$ 15.00, 1 inch copy \$28.00, VHS copy \$12. Produced for the NMFS/Marine Refuse Disposal Project--for general audiences, as well as for sports and commercial fishermen. Spots are not location specific. Tag line reads " Sponsored by NOAA/National Marine Fisheries Service". Description of PSAs attached.

From: Tom Gentle, OSU Extension/Sea Grant Program, Agricultural
Communications Department, Oregon State University, Corvallis, OR
97331, 503-754-3311.

- - -

* Radio Public Service Announcements

A series of six 30 or 60 second public service announcements produced for the NMFS/Marine Refuse Disposal Project for rotation on radio stations. Tag line says "sponsored by your local port " (\$50 for the series or \$10 for any individual announcement, additional cassette copies @ \$1.25) Spots range in nature from serious to humorous. The tag line can be changed if desired to advertise your port or organization (each PSA @ \$30), or new PSAs can be developed. Price list attached.

From: LeeMark Productions, 1857 N. Fremont Street, Chicago, Illinois,
60614, 312-664-9456 or 312-935-8779.

- - -

* Newspaper or Trade Journal Public Service Announcements

Four different announcements with photographs for commercial fishing, recreational boating, merchant shipping, plastics industry, or petroleum industry audiences. (One included in Appendix 5).

From: Center for Environmental Education, 1725 DeSales St, NW, Suite 500,
Washington, D.C. 20036, 202-429-5609.

POSTERS

- * "Don't Teach Your Trash to Swim!", blue & white, 11" x 17"
Poster shows fish entangled in six-pack ring, with the caption "Don't Teach Your Trash to Swim!" appearing under fish. Additional message appears on poster:
Packaging Line Nets Thrown Overboard
Hurt You and Other Marine Life
Please Keep Refuse On Board Until You Land

Price list attached.

From: Pioneer Printing, 231 N. Coast Hwy, Newport, OR 97365, 503-265-5242,

- - -

- * "Our Ocean Is Drowning"
Poster is large and brightly colored and depicts common items floating in the sea. The message reads "Our Ocean is Drowning Stow your trash and prevent marine debris". Free.
From: Natural Resources Consultants, 4055 21st Ave West, Seattle, WA 98199, 206-285-3480.

DECALS/STICKERS/BUMPER STICKERS

- * "Don't Teach Your Trash to Swim" - (4" x 6 ") blue and white for trash can, vessel or bumper"- depicts fish in six pack ring. Price list attached.
From: Pioneer Printing, 231 N. Coast Hwy, Newport, OR 97365, 503-265-5242.
- - -
- * "Stow It"- (4" x 6") multicolored- for vessel windows or trash cans, depicts common items floating in ocean. Free.
From: Natural Resources Consultants, 4055 21st Ave West, Seattle, WA 98199, 206-285-3480
- - -
- * "Stow It, Don't Throw It !" - (2.5" x 9") blue and white, for boat trailer bumpers, white letters on blue background, with stylized wave design
From: Center for Environmental Education, 1725 DeSales St, NW, Suite 500, Washington, D.C. 20036 202-429-5609.
- - -

- * Warning labels— "Don't Teach Your Trash to Swim" flourescent orange or green one and one-half inch diameter sticker. Price list attached.
From: Pioneer Printing, 231 N. Coast Hwy, Newport, OR 97365, 503-265-5242.

COLORING BOOKS

* Coloring Book, 16 pages. Price list attached.

From: Pioneer Printing, 231 N. Coast Hwy, Newport, OR 97365, 503-265-5242.

Also contact: Alan Bunn, NMFS/Marine Entanglement Research Program, 7600 Sand Point Way NE, Seattle, WA 98115, 206-526-4127.

PLAQUES FOR FISHING VESSELS

* Plaque contains fisherman's pledge for a clean ocean, walnut base with brass plate (9" x 12"). Nice for hanging in the galley or in the wheel house. Vessel's name will be engraved on top of the brass plate. Words are silk screened on the plate in bold letters. Available for \$25.00 for U.S. orders, and for \$27.50 for foreign orders. Send a check in U.S. currency for the appropriate amount and specify the vessel name. (Words can also be translated into other languages, the \$27.50 price holds only for orders of a hundred or more).

From: The Highliners Association, 4055 21st Ave West, Seattle, WA 98199, 206-285-3480.

LOGO AND CAPTION

* logo (fish in six-pack ring)

* caption (Don't Teach Your Trash to Swim !)

(see Appendix 7)

People are free to reproduce the logo or caption for non-profit uses, as long as credit is given to the artists if either appears in written publication. Additionally, please send the appropriate artist two copies of items on which the caption or logo appears. If profit is to be made, the artists should be contacted directly to discuss royalty amounts.

Herb Goblirsch- fish design: 6720 Otter Crest Loop, OtterRock, OR 97369 (503-765-2193)

Bill Murray-caption: PO Box 716, South Beach, OR 97366 (503-867-6586)

PIONEER PRINTING

231 North Coast Highway, Newport, OR 97365, 265-5242

Contact: Dave Schank or Carol Schank

Please call for a quote if other quantities are desired. Please send a purchase order number or billing information with your order. Shipping charges are additional. Prices quoted 11/23/87

POSTERS (11" X 17", blue and white, 80# book stock)

Poster shows fish entangled in six-pack ring, with the caption "Don't Teach Your Trash to Swim!" appearing under fish. Additional message appears on poster :

	Packaging Line Nets
	Thrown Overboard
	Hurts You and Other Marine Life
	Please Keep Refuse On Board
	Until You Land
100	\$ 79.67
500.	\$117.50
1M	\$132.40
2M	\$212.45
3M	\$299.00
4M	\$370.00
5M	\$442.96
8M	\$675.47
10M	\$829.47

VINYL STICKERS (4" X 6" blue removable sticker, depicts fish in six pack ring and caption "Don't Teach Your Trash to Swim!")

1M	\$175.80
2M	\$301.00
3M	\$437.00
5M	\$694.00
6M	\$831.00
7M	\$960.00
8M	\$1090.00
9M	\$1219.00
10M	\$1349.00

COLORING BOOKS (16p. (8 1/2 x 11)- ocean debris & anti-littering theme).

1M	\$355.68
2M	\$536.00 (call for quotes on other quantities)

(On orders of 500 coloring books or more you can have information about your organization and its activities appear on the inside front cover. Enclose no more than a page of typed or printed information. It will be printed exactly as is appears.)

WARNING LABELS (Orange or Green Fluorescent 1 1/2 inch diameter- depicting fish entangled in a six pack ring and caption "Don't Teach Your Trash to Swim!").

1M	\$ 46.00
2M	\$ 80.00
5M	\$147.00
10M	\$220.00

THE LASTING IMPRESSION

PO BOX 8, Newport, Oregon 97365, 503-265-8535

Contact: Dick Fowler or Gary Grace

BROCHURE (full color, 8 1/2" X 11", folded in thirds. 80# Shasta Sde).

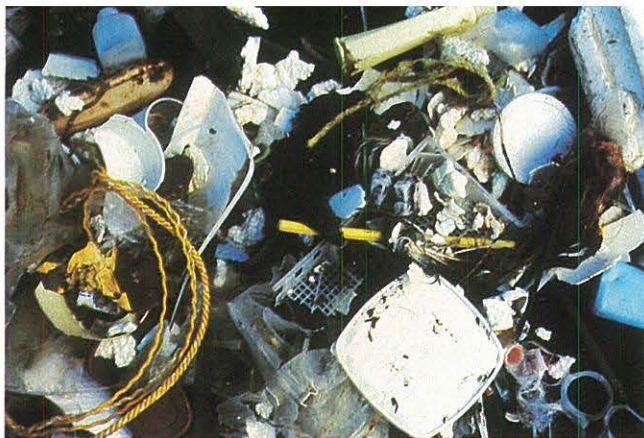
Photocopy attached. Please call for a quote on quantities not listed. Your logo and caption can replace "NOAA National Marine Fisheries Service" and logo on the front panel and you can reword and utilize space below the "Don't Teach Your Trash To Swim" panel on the back of the brochure. (Areas circled on photocopy). These changes will be made in black ink only, and will cost an additional \$25 per order. You must send camera ready copy. Shipping costs are additional.

Quantity*	Price	price per brochure
3000	820.40	27.4 cents
5000	1019.55	20.4 cents
10,000	1363.50	13.6 cents
50,000	4663.60	9.3 cents

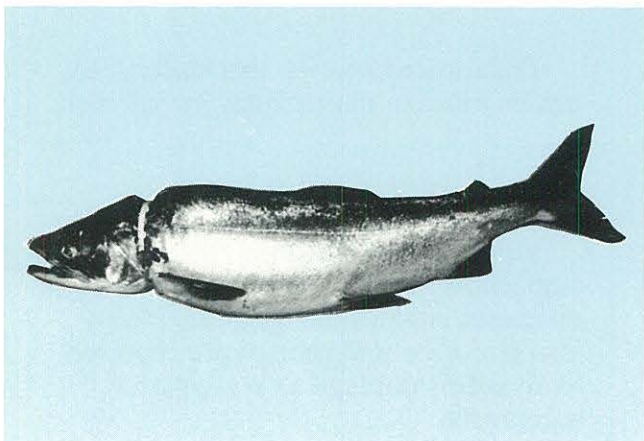
Prices quoted: 8/27/87

* NOTE: THE PRINTER IS WILLING TO GROUP SMALLER ORDERS TOGETHER UNTIL A SIZABLE QUANTITY OF ORDERS IS RECEIVED- i.e. so the price becomes about 9 or 10 cents per brochure.

Contact the printer to let him know how many brochures are wanted. Send him the camera ready logo and copy, and enclose a purchase order or billing information.

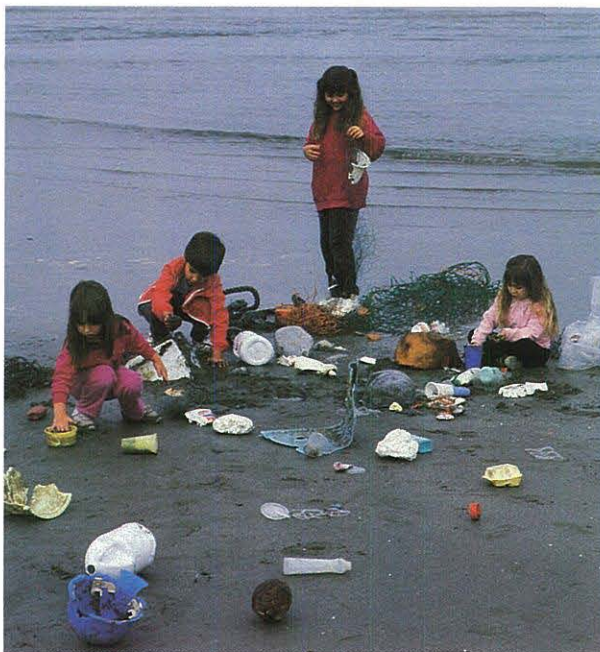


Plastics can last for hundreds of years in lakes, rivers and marine waters. A careless moment lasts generations.



Cecil Ranney

... AND THE ANIMALS
ARE SUFFERING.



Jim Boeder

You can help!

- Make it boat policy that no trash is discarded, washed or blown overboard.
- Minimize the amount of non-degradable products on board. Provision your vessel using bulk/refillable containers.
- Stow trash for disposal in port. Encourage your port or marina to provide convenient refuse disposal facilities.
- Where possible retrieve trash encountered in the water.
- Share your concern with friends, fellow mariners and family.
- Participate in beach clean-ups, and leave the beach clean after visits.

**DON'T TEACH YOUR TRASH
TO SWIM!**

WGM

The National Marine Fisheries Service
Encourages All Boaters And Beach-Goers
To Protect The Marine Environment



NASA

OUR WATER PLANET
IS BECOMING
POLLUTED WITH
PLASTIC DEBRIS . . .



National Oceanic and
Atmospheric Administration
National Marine Fisheries Service



Brian Lawhead

Some 30,000 Northern Fur seals die yearly from entanglement in netting, a 50% population decline in 30 years has been noted.

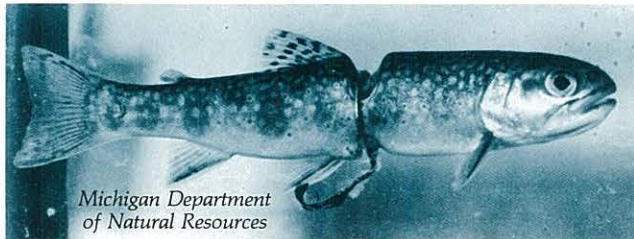
Common items like six-pack rings, fishing line and strapping bands entangle and kill sea birds, fish and mammals. Plastics can last many hundreds of years, harming even large mammals like the gray whale.



Pierce Harris

Debris Harms Our Aquatic Life

George Antonelis



Michigan Department
of Natural Resources



Dale Snow



Frans Lanting

Birds, fish and mammals mistake plastic for food. Some birds even feed it to their young!

With plastic filling stomachs, animals may die of starvation or poisoning.



Rex Herron

Endangered species also suffer. Sea turtles mistake plastic bags for jellyfish.

Fishermen and boater safety is jeopardized when debris fouls propellers or causes engines to overheat. Heavy losses of time and money are reported from debris damage to vessels and equipment.



Jim Boeder

LEEMARK PRODUCTIONS
1857 North Fremont Street, Chicago, Illinois 60614
Contact: Lee Reilly 312-664-9456
Mark Guncheon 312-935-8779

RADIO PUBLIC SERVICE ANNOUNCEMENTS (PSA)

PSAs are set to music, call to hear or for more information.

Set of six 30 and 60 second PSAs	\$50.00
or each individual LeeMark PSA	\$10.00
on labeled cassette copy	
Each additional labeled cassette copy*	\$1.25

Generic tag line : "sponsored by your local port"

Local tag line added to any existing	
LeeMark PSA includes remix, 1 cassette copy...	..\$30.00
Each additional labeled cassette copy*	\$1.25

Additional labeled copies ordered at	
later date :	
	Set-up charge \$10.00
	Each copy \$ 1.25

Create new 1 minute PSA	\$250.00
includes transcript and 1 cassette copy	

30 second version of newly created (above) PSA	\$60.00
includes transcript and 1 cassette copy	

Create four or more 1-minute PSAEach PSA	\$225.00
includes transcripts and 1 cassette copy	

30 second versions of newly created (above)PSA	Each \$50.00
includes transcripts and 1 cassette copy	

* Copy prices depend on quantity.

NOTE: Shipping costs are additional on all orders.

TELEVISION PUBLIC SERVICE ANNOUNCEMENTS

ADVERTISER: NOAA/NATIONAL MARINE FISHERIES SERVICE

LENGTH: 30 second announcements

NUMBER: A series of 4 PSAS for rotation on TV programs

Contact: Tom Gentle, Communications Specialist, OSU Extension/Sea Grant Program, Agricultural Communications Department, Oregon State University, Corvallis, OR 97331, 503-754-3311.

Prices for the series: 3/4 inch tape \$15, 1 inch tape \$28, VHS tape \$12

SPOT 1 : NMFS-1 MARINE LITTER KILLS

Video

Audio

Open on slide showing plastic

This is marine garbage.

8#trash.

Bird entangled in line

And this is what it does.

Pan of six-pack rings

Each year plastic,

(Continue showing slides
of injured wildlife

styrofoam, and other debris
injure and kill hundreds of
thousands of our wildlife,

sea-gull

sea-lion

fish

and causes millions of
dollars in damage to our
vessels

sea-lion

turtle

monk seal

whale

The answer. If you're
at sea, bring your debris
back to shore for disposal.

bird eating cigarette butt

Person picking up garbage

If you're on shore—pick it up.

Vessel coming into harbor

And if your marina doesn't
have adequate disposal. ASK
for it.

Sea lions in group

(Picture shrinks to corner

and focuses in on sea lion

with web on neck as words

appear on screen) Marine garbage.

If you're not part of the solution,

then you are part of the problem

Marine garbage. If you're
not part of the solution,
then you are part of the
problem.

SPOT 2 : NMFS-2 FISHING DERBY

Video

Fade up on close up of
"Annual Fishing Derby" sign
as camera zooms
out to show John and
Fred

John leaves, Fred enters

FRED leaves, Jim enters

Fred leaves as Jim stands
holding bag of trash

"Bring back a real trophy.
Bring back your plastic trash."
(words appear on screen)

Audio

Annncr.:
AND IN THIRD PLACE,
WELCOME JOHN WILCOX
FOR HIS 5 POUND RED
SNAPPER

SFX: CLAPPING
SECOND PLACES GOES
TO FRED COX FOR HIS
8 POUND BLACK SEA BASS

SFX: CLAPPING
AND IN FIRST PLACE..
A BIG HAND FOR JIM
CASSIDY FOR HIS 18
POUND BAG OF PLASTIC
TRASH.

SFX: LOUD CLAPPING
& CHEERING

PLASTIC AND OTHER TRASH
KILLS OUR MARINE LIFE AND
DESTROYS OUR
ENVIRONMENT. SO
BRING YOUR TRASH
BACK TO PORT. IT'S
ONE TROPHY YOU CAN
REALLY BE PROUD OF.

SPOT 3 : NMFS-3 SHOW & TELL

Video

Fade up on Tommy looking into camera. Camera zooms out as Tommy emptys bag onto a table

Camera pans these items

Cut back to Tommy as he listens to question. his finger across his neck and says...

Tommy says...

Tommy grabs handful of trash and raises it up

Audio

TODAY IN SHOW AND TELL,
TOMMY'S GOING TO SHOW US
ALL THE WONDERFUL THINGS
HE COLLECTED ON HIS TRIP
TO THE BEACH.

AH...THERE'S A SEA SHELL,
A PLASTIC BOTTLE, SOME DRIFTWOOD,
A SIX PACK RING, PLASTIC BAGS,
LOTS OF STYROFOAM, FISHING LINE,
MORE PLASTIC. VERY
GOOD TOMMY. AND DO YOU
KNOW WHAT PLASTIC AND
OTHER GARBAGE LIKE THIS
DOES TO OUR FISH AND Tommy slices
WILDLIFE?

"IT KILLS IT"

WHAT SHOULD WE DO ABOUT THIS
PROBLEM?

" TELL EVERYONE NOT TO LITTER OUR
OCEANS"

SO NEXT TIME YOU'RE OUT
ON THE WATER BRING BACK A
REAL TROPHY.

SPOT 4 : NMFS-4 FISHERMAN

Video	Audio
Terry Thompson, Commercial Fisherman	TWO YEARS GO COMMERCIAL TRAWLERS DEVELOPED A PROGRAM TO CLEAN UP OUR OCEANS OF PLASTIC TRASH. EVERY YEAR MILLIONS OF MARINE ANIMALS ARE KILLED OR INJURED BY PLASTIC GARBAGE TOSSED OVERBOARD.
Whale swimming in ocean	
Terry Thompson	WE NOW KNOW THAT MUCH OF THE PLASTIC DEBRIS IN THE OCEAN COMES FROM OUR RIVERS AND BAYS.
Fisherman in bay picking up plastic trash	IF WE ALL WANT A CLEAN OCEAN , WE'LL NEED THE HELP OF SPORTS FISHERMEN AND RECREATIONAL USERS OF OUR INLAND WATERS.
Fisherman holding up bag of trash "Bring back your plastic trash" (Words appear on screen)	SO NEXT TIME...BRING BACK A REAL TROPHY.. BRING BACK SOME PLASTIC TRASH.

APPENDIX 3: WASTE MANAGEMENT INFORMATION

WASTE MANAGEMENT AND RESOURCE RECOVERY PUBLICATIONS

FREE GUIDEBOOK:

Recycling and Composting in County Solid Waste Management Planning (32 pages), Prepared by Resource Recovery Systems. Available from: Michigan Department of Natural Resources, Resource Recovery Section, P.O. Box 30028, Lansing, MI 48909.

FOR PURCHASE:

The following studies are available (enclose payment or purchase order) from Institute For Local Self Reliance, Publications, 2425 18th Street, N.W., Washington, D.C. 20009:

- Designing the Waste Stream: A Working Paper on Source Reduction: \$12.00
- Recycling Goals and Strategies: \$12.00
- Solid Waste Technology and the Society for the Future: \$12.00
- The Legal and Regulatory Climate for Municipal Solid Waste Incineration: \$12.00
- (All four of the above studies for \$40.00)
- Proven profits from Pollution Prevention, Vol II, 1988: \$20.00
ISBN: 0-917582-40-3 (Vol I of same title, 1986 : \$25.00,
ISBN: 0-917582-47-0).
- Directory of Waste Utilization Technologies in Europe and the United States, 1988: \$50.00. ISBN: 0-917582-41-1.
- Garbage Disposal Economics: A Statistical Snapshot, 1987: \$200
(community group discounts) ISBN: 0-917582-45-4.

FROM A LIBRARY OR FOR PURCHASE FROM THE PUBLISHERS:

Energy Savings By Wastes Recycling, Edited by Richard Porter and Tim Roberts
Environmental Resources Limited, 1985, Elsevier Science Publishing Co, Inc.
52 Vanderbilt Avenue, New York, NY 10017 ISBN 0-85334-353-5.

Practical Waste Management, Edited by John R. Holmes, 1983, John Wiley and Sons Ltd., New York ISBN 0-471-10491-4.

Resource Recovery Planning and Management, Robert M. Clark and James I. Gillean
1981, Ann Arbor Science Publishers, Inc. 230 Collingwood, PO Box 1425 ,
Ann Arbor, Michigan, 48106 ISBN 0-250-40298-X, LCCN 80-70320.

Solid Waste Management and the Environment: The Mounting Garbage and Trash
Crisis, Homer A. Neal and J.R. Schubel, 1987, Prentice-Hall Inc.
Englewood Cliffs, New Jersey 07632 ISBN 0-13-822891-4, LCCN 86-63350.

Waste Management Planning, Evaluation, Technologies, David C. Wilson, 1981
Clarendon Press Oxford, Oxford University Press, Walton Street, Oxford OX2 6DP.

PLASTICS RECYCLING

Information presented below is used with permission of:

Resource Recycling Inc.

PO Box 10540

Portland Oregon 97210 publishers of

Resource Recycling Magazine

Subscription rate \$27/year (7 issues) \$48/2 years.

Single issues \$4.00

Reprints of articles (see some listings below) are available at \$1.00 each

Plastics Recycling Update- a monthly newsletter

Subscription rate \$85/year.

This information is excerpted from a series on European plastics recycling (for full articles see reprint listings below) researched and written by Gretchen Brewer, under sponsorship from the German Marshall fund of the United States:

Advanced Recycling Technologies, Ltd (ART) of Belgium and Recycloplast AG of West Germany are two of a handful of European firms that have pioneered innovations that allow reclamation of plastics wastes that were previously considered non-recoverable: mixed plastics from municipal refuse and industrial scrap too contaminated for in-plant recycling. The two key breakthroughs in this area are systems that utilize the mixed plastics wastes from municipal, commercial, and industrial operations as-is and systems that are designed to extract the predominant polyolefin fraction from other plastic wastes.

Growing European interest in plastics recycling was a push-pull phenomenon, with characteristics similar to those in the United States. The push is provided by shrinking landfill capacity, rising disposal costs, reservations about refuse incineration, and increasing public concern about the growing percentage of plastics in the waste stream, particularly in packaging materials. The pull is Western Europe's dependence on high-priced imports of petroleum and natural gas feedstocks for plastics manufacturing plus domestic shortages of other raw materials (wood, metal) for which recycled plastics may substitute. One further development in West Germany helped to improve plastic recycling economics-- the programs that had been set up there to process and separate wet wastes (compostables) and dry wastes (70% recyclables). These separation operations initially provided paper, glass, metal, and textiles to recycling markets, with the left-over wastes-- mostly mixed plastics requiring disposal in a landfill. This steady stream of plastics was available then to be diverted into plastic recycling operations.

ART's patented system called Extruder Technology I (ET/1) is now operating in 12 plants in Europe and the Soviet Union. Its first United States plant has been installed in Michigan by Processed Plastics, a division of Summit Steel. This system accommodates many different plastic materials and up to 40% contamination by other materials commonly present in municipal, commercial, and industrial plastic wastes (paper, glass, dirt, metal, etc.)

The products produced by this ER/1 system typically substitute for wood, concrete, and metal. They are posts, poles, stakes, and slats of various dimensions. Products can range from 1 to 4 meters in length and in cross sections of 2.5 centimeters in diameter for circular poles, to 12 x 12 centimeters for a square pile. Like wood, the products can be nailed, screwed, cut and planed with standard woodworking equipment, pigmented or painted, and do not conduct electricity. The products are water and chemical resistant, rot proof, and can withstand freezing and thawing. The most common applications of the products are boardwalks, piling and staging in marshlands, dock surfaces and piers, vine stakes, pig sty floor slats, horse ranch fencing, road markers, reflecting posts, and electrified cattle fences.

The system has a modular design and moderate price. Excluding preparation equipment, the complete unit (including one set of molds) costs \$200,000-\$250,000. The output of a single unit averages 500 tons per year. The low costs of molds (\$2000-\$4000) means that a single unit can produce a wide range of products. For more information contact Advanced Recycling's U.S. representative: John Maczo, Mid-Atlantic Plastic Systems, Inc. PO Box 507, 320 Chestnut St, Roselle, NJ 07203, 201-241-9333.

The Recycloplast technology is operating in 3 plants in West Germany and others are pending in Switzerland, Taiwan, and elsewhere. The process was patented in the U.S. in 1980, and a U.S. office established in 1986. This system too can operate with a mixed range of plastics and tolerate contamination of 30%-50% by other materials.

The Recycloplast products are generally large, thick-walled items such as pallets, grates, manhole covers, wall and flooring sheets, planter tubs, sound absorbing walls, signpost bases, composting boxes, and cable reels. The products cannot be made with a thickness of less than 4mm nor can they be blow-molded, injection-molded or extruded. These products are totally waterproof and rot proof, inedible (for livestock applications) and shock absorbing and sound attenuating.

The typical plant size is 20,000 square feet— half for equipment, half for storage. Electrical service of 800 kilowatts is required, with power use of 500 kw per hour. Throughput is 5000 tons per year on three shifts and the cost of a facility (plant and installation) is about \$5-\$6 million dollars. Smaller plants are also available (2500-3000 tons per year) at prices ranging from \$1 million to \$4.5 million. For more information contact Hans Weilandt, Recycloplast of North America. PO Box 2043, 150 Louis Street, South Hackensack, NJ 07606, 201-440-2100.

MORE INFORMATION ON PLASTICS RECYCLING AND RECYCLING EDUCATION

The Plastics Institute of America, @ Stevens Institute of Technology, Castle Point, Hoboken, N.J. 07030 may be a source of information about plastics recycling. They sponsored a conference recently (May 25-26, 1988 in Washington, D.C.) called "Plastics Recycling As A Business Opportunity", information may be available from that conference.

All the information below is copied from the March/April 88 Resource Recycling with permission from Resource Recycling Inc. PO Box 10540 Portland, Oregon 97210.

Reprints of the following articles from Volume VI issues (March 1987-February 1988) are available for \$1 each from above address:

Plastics

"Research in Plastics Recycling"	Mar/Apr
Plastic Processor to Expand (NV)	Mar/Apr
"European Plastics Recycling, Part 1"	May/June
A Refillable on the Horizon (NV)	May/June
Degradable Plastics Considered (NV)	May/June
"European Plastics Recycling, Part 2"	July
Plastics Process (NV)	July
Plastics Ban (NV)	July
Federal Plastics Bills (NV)	July
Samples of Reclaimed PET (NV)	July
Refillable PET (NV)	July
Plastics Shipped (NV)	July
Regional Recycling Center Purchases Plastics (SW)	July
"Why All the Fuss about Plastics?"	Sept/Oct
"European Plastics Recycling, Part 3"	Sept/Oct
"The Case for HDPE Recycling"	Sept/Oct
"Profile of a Leading Plastics Recycler"	Sept/Oct
"Rubbermaid Uses Recycled Products"	Sept/Oct
Plastics Recycling Group Formed (PA)	Sept/Oct
"European Plastics Recycling, Part 4"	Nov/Dec
New Jersey Plastic Recycling Corporation Formed (SW)	Nov/Dec
Environmental Official Urges Plastics Recycling (SW)	Nov/Dec
Ban on Fast Food Containers (PA)	Nov/Dec
SPI Adopts New Policy Statements (NV)	Nov/Dec
"Plastics Recycling in the Third World"	Jan/Feb
Billboard Campaign Launched (PA)	Jan/Feb
Packaging Task Force Opposes Plastic Container (SW)	Jan/Feb
Plastics Legislation Introduced (SW)	Jan/Feb
McDonald's Urged to Use Biodegradable Packaging (SW)	Jan/Feb

Educational materials on recycling

- **A-WAY With Waste: A Waste Management Curriculum for Schools**, 2nd edition. Washington State Department of Ecology, 4350 150th Ave., NE, Redmond, WA 98052. CONTACT: Jan Lingenfelter.
- **Biogradable, A Science Unit for 4th Grade**. Columbus Clean Community, 181 South Washington Blvd., Columbus, OH 43215.
- **A Case of Waste**. 4-H Youth and Development Office, Box 4, Robert Hall, Cornell University, Ithaca, NY 14850. CONTACT: MaryLou Brewer.
- **Don't Waste Waste!** Environmental Action Coalition, 625 Broadway, New York, NY 10012; (212) 677-1601.
- **Eco-News**. Environmental Action Coalition, 625 Broadway, New York, NY 10012; (212) 677-1601. Ask for back issues related to recycling.
- **The Great Glass Caper: An Educational Kit**. Pennsylvania Glass Recycling Corporation, 509 North Second Street, Harrisburg, PA 17101; (717) 234-8091. Materials are geared toward 4th, 5th and 6th grades. CONTACT: Doug Gib-boney.
- **Here Today, Here Tomorrow: A Curriculum on Recycling, Energy, Solid Waste**. Conservation and Environmental Studies Center, Inc., 120-13 Whitesbog Road, Browns Mills, NJ 08015. Developed in conjunction with the New Jersey Department of Energy, Office of Recycling.
- **Let's Recycle! Instructional Worksheets and Activities**. Office of Recycling, Department of Waste Management, Town of Brookhaven, 3233 Route 112, Medford, NY 11763; (516) 451-6220. CONTACT: Elaine Maas. Available to Town of Brookhaven teachers who have taken part in the Recycling Education Program.
- **Let's Recycle! Lesson Plans for Grades K-6 and 7-12**. U.S. Environmental Protection Agency. (SW-801), 1980, Office of Water and Waste Management, Washington, DC 20460.
- **The Lone Recycler: A Comic Book on Recycling**. Materials World Publishing, 1089 Curtis, Albany, CA 94706.
- **Oscar's Options**. Department of Environmental Management, State of Rhode Island, 9 Hayes Street, Providence, RI 02908; (401) 277-3434. CONTACT: Carole Bell. Curriculum guide.
- **Out of Sight, Out of Mind? A Guide to Solid Waste and Recycling Investigations for Kindergarten Through Sixth Grade**. Sage Recycling, P.O. Box 1001, Boulder, CO 80306.
- **Publicity and Education for Recycling: An Informative Guide**. Tanis Rickmers-Skislak, 3319 Willow Crescent Drive #32, Fairfax, VA 22030.
- **Recycling for Reuse**. Publication 4-H 362, 4-H Program, University of Wisconsin Extension, 328 Lowell Hall, 610 Langdon Street, Madison, WI 53703. [A curriculum guide will be published in Spring 1988 by the Bureau of Solid Waste, Wisconsin Department of Natural Resources, P.O. Box 7921, Madison, WI 53707; (608) 267-7565. CONTACT: John Reindl.]
- **Recycling Lesson Plans and Activities, Elementary and Secondary Levels**. 108 E. Green Street, Ithaca, NY 14850; (607) 673-3470. CONTACT: Lynn Leopold.
- **"Recycling Education: Developing a Curriculum."** Dan Cotter, *Resource Recycling*, July/August 1985, September/October 1985, P.O. Box 10540, Portland, OR 97210; (503) 227-1319.
- **Super Saver Investigators**. Office of Litter Prevention, Ohio Department of Natural Resources, Fountain Square, Building F, Columbus, OH 43224; (614) 265-6444. CONTACT: David Landis. An elementary interdisciplinary guide to recycling, solid waste management and littering — to be published early Summer 1988.
- **Space Station: EARTH. A Recycling Video Program for 4th-5th Grades**. Solid Waste Management Division, Snohomish County Public Works, 4th Floor, County Administration Building, Everett, WA 98201; (206) 259-9425. CONTACT: David M. Polis.
- **Spreading the Word: A Publicity Handbook for Recycling**. Association of New Jersey Environmental Commissions, 300 Mendham Road, P.O. Box 157, Mendham, NJ 07945. Contains photo-ready graphics.
- **The Trash Monster and The Wizard of Waste**. California State Department of Education, Publication Sales, P.O. Box 271, Sacramento, CA 95802; (916) 445-4688. Recycling education kits (the former for 2nd-3rd grades, the latter for 4th-5th grades).
- **Woody Waste Wise**. Cornell Media Services, Audio Visual Resource Center, Building 8, Research Park, Ithaca, NY 14850; (607) 255-2090. CONTACT: Carol Doolittle. Slides, tape and script, with activities.

APPENDIX 4 : FORMS AND SURVEYS

QUESTIONS FOR PORT PERSONNEL INVOLVED WITH PORT OPERATIONS OR REFUSE HANDLING RELATED TO IMPROVING THE REFUSE SERVICE FOR OUR USERS

Effective December 1988, it will be illegal, due to an international treaty called Annex V of MARPOL, for vessels to dispose of any type of plastic material (as well as other materials, depending on distance from shore and other factors) into the ocean. This law also obligates ports to provide good refuse service to its vessels. Please help us improve our refuse facilities by by answering the following questions.

1. When are the port's busiest times?
Are the refuse containers adequate then?
2. If our vessels began returning their refuse to port,
could our refuse facilities handle it?
3. Where are more or larger containers needed?
4. What things should the port do to improve the convenience of the refuse
containers or areas?
5. A good place at the port for the vessels to offload or dispose of their
unwanted _____ is:
6. A good place at the port for the vessels to offload or dispose of their
unwanted _____ is:
7. What type materials do the vessels need help getting rid of? How could the
port assist?
8. The port could establish a refuse and recyclable material storage area at:
9. What materials and equipment does the port have that could be used or
adapted to receive, store, or transport refuse and recyclable materials?
10. I have heard complaints about:
We could resolve this problem:
11. Other comments and suggestions:

QUESTIONS FOR PORT PERSONNEL
ABOUT EDUCATING PORT USERS AND THE COMMUNITY ABOUT THE MARINE DEBRIS PROBLEM

Plastic is virtually non-degradable once discarded into the ocean and is causing the death, of millions of sea animals each year which entangle in or ingest these materials. Vessels are damaged and mariner safety threatened when debris fouls propellers and intakes. Shorelines have become littered with hundreds of tons of plastic. International concern over these impacts lead to changes in the law. Annex V of MARPOL, effective December 1988, prohibits the disposal of all plastic materials (as well as other materials, depending on distance from shore) into the ocean and requires refuse containers be provided in port to accept these materials.

We need to inform the port's users and the community of this marine debris problem and encourage their compliance with the new law. Please help us by answering the following questions:

1. Where should notices and posters related to this problem be posted at the port so that mariners will see them (be specific)?
2. Can you name supply stores, restaurants, and other places that mariners frequent?
3. Who are influential members or spokespersons for the various mariner groups? (e.g. fishing groups, trade unions, shipping companies, charter groups, law enforcement groups, etc.)
4. Do you have a spouse, friends, or acquaintances who are connected with the marine community? Who?

_____ I would be willing to give them information about this problem and encourage their involvement in informing their peers.

6. Where in the community would notices and posters be effective?
7. Do you know people who work for the media that might be interested in this issue? Who?

Do you know people who work in the school system? Who?

_____ I would be willing to give them information about this problem and encourage their involvement in informing others.

8. Are you a member of a service organization or community group which might be interested in seeing a video or slide presentation about this problem and hearing about port efforts? Which group?

Name:
Work place:

Phone:

QUESTIONS FOR PORT USERS
RELATED TO IMPROVING REFUSE SERVICES AT THE PORT

The Port is interested in improving its refuse reception facilities and services to make it easier for our users to comply with the new regulations against disposal of plastics and other materials at sea (see attached notice).

These new regulations, effective December 1988, resulted from international concern over the effects of marine debris, especially the persistent plastic materials, which endanger animal life, create safety hazards for mariners, and litter coastal beaches. This law, called Annex V of MARPOL also requires all commercial docking facilities to provide adequate refuse reception facilities to their vessels. Please help us improve our services by answering the following questions (use the back for more space):

1. Is it easy for you to get rid of your refuse in port now?
2. Where are more or larger refuse reception containers needed?
3. Refuse containers need to be emptied more frequently at:
4. Is there any particular type of materials that are difficult for you to dispose of in port?

What should the port do to help you dispose of these materials? (Be specific if you can, i.e. suggest places to establish a reception area, mention the equipment, services, or assistance that you could use):

5. A good place to establish an area to receive refuse and recyclable materials would be:
6. Other ideas and comments for improving refuse reception facilities and services:
7. Would you be willing to help inform your peers about the marine debris problem and the new refuse disposal law by posting notices, posters, or dispersing brochures, etc.?
8. Are you a member of an industry group or community organization which might be interested in seeing a video or slide presentation about the marine debris problem? Which group?

Would you help us schedule this presentation and advertise it?

Name:

Address:

Phone:

OPINION SURVEY

(Please use the back if more space is needed)

1. I _____ have _____ heard of the concern over plastics in the ocean and the
have not new laws which regulate refuse disposal at sea.

How did you know about it ? (Be specific if possible):

2. Do you have a trash receptacle(s) on your vessel? _____yes _____no

It is a _____trash can _____bag _____bucket _____compactor _____other (explain!

3. What percent of your non-degradable trash do you return to port?

_____ 100% _____ 90-100% _____ 80-90% _____ 70-80% _____ 60-70% _____ 50-60%

_____ 40-50% _____ 30-40% _____ 20-30% _____ 10-20% _____ 0-10% _____ 0%

4. Where do you dispose of the non-degradable trash you return to port:

5. Garbage service at the Port of _____ _____ fully meet(s) my needs!
_____ partially
_____ doesn't

Service could be improved by:

6. Of the mariners I know, _____ 100% keep plastics on board.
_____ 75%
_____ 50%
_____ 25%
_____ 0%
_____ other (fill in)

7. What do you think would be the best ways to encourage mariners to keep plastics on board?

FOR FISHERMEN & BOATERS

MARINE DEBRIS SURVEY

Date: _____ Vessel Name: _____

I'm working with the Port marine debris project, do you mind me asking you a few questions?

1. Where's your home port? _____
2. What kind of fishing are you doing now? _____
3. How do you presently keep your trash on board?
trash can _____ a bag _____ a bucket _____ other _____
4. How long are your average trips ? _____ days
5. How do you usually dispose of your trash ?
overboard _____ fish processors _____ port _____ home _____
other _____
6. How much trash do you generally have each trip? _____ gallons.
7. Where do you store your trash on board? _____
8. Have you heard about the marine litter problem? yes _____ no _____
Where? _____
9. Have you ever seen animals entangled in or eating garbage? yes _____ no _____
It was a bird _____ fish _____ crab _____ mammal _____
turtle _____ other _____
10. Have you ever been in danger or had vessel or gear problems due to debris?
yes _____ no _____. If yes:
Where did this happen? _____

What kind of debris caused the problem? _____
What happened? _____

Did you have to be towed? yes _____ no _____. How many miles? _____
Were you towed by the Coast Guard? yes _____ no _____.
Was there a repair bill that resulted from this incident? How much? \$ _____
How much time was lost due to this incident? _____.
About how much would this time have been worth to you? \$ _____.
11. Is refuse disposal easy for you now? How could it be made more convenient?

REFUSE COMPOSITION STUDY

Study the types of refuse found in the refuse containers to better understand refuse needs and recycling options.

Method: Pick a few refuse containers at random from each port area. Remove all or a part of the refuse at random from the containers. Sort refuse by its material composition or class. Use a bag or box as your standard for recording volume. Fill this container with each type of material (as it was in the refuse container, i.e. do not compact cardboard boxes, or smash glass items) and note its volume. Repeat this procedure periodically at each port area, until a good sample size has been obtained. Make any notes of unusual items or irregular samples (e.g., if one item filled dumpsters).

DATE: Recreational Marina	DATE: Commercial moorages	DATE: Shipping Terminals	Total
---------------------------------	---------------------------------	--------------------------------	-------

Refuse Volumes

PLASTIC
(household)

NON-DEGRADEABLE
(gear/work materials)

ORGANIC MATERIALS &
PAPER ITEMS

METAL

GLASS

CARDBOARD

WOOD

OTHER: _____

OTHER: MISCELLANEOUS

Number of Dumpsters
in Sample :

NOTES: _____

REFUSE HANDLING RECORDS

Thank-you for keeping these records. This information will help us evaluate refuse service efficiency and our efforts at informing port users of the marine debris problem. Please note the number of refuse or recyclable containers emptied (or their volumes). Note any additional refuse items handled such as nets, cable, crates, etc. Also note the time spent for all refuse handling tasks, e.g. emptying dumpsters, cleaning refuse areas, etc., and any problems or comments you have. Put the date at the top of each section and begin a new section for each day. Write "none" across the section if no containers were handled that day.

Date_____	Dock 1	Dock 2	Dock 3	Total
Refuse Containers or Volume				
Recyclables Containers or Volume				
Other Refuse Items (note size or volume)				
Time Estimate				
Comments				

Date_____	Dock 1	Dock 2	Dock 3	Total
Refuse Containers or Volume				
Recyclables Containers or Volume				
Other Refuse Items (note size or volume)				
Time Estimate				
Comments				

APPENDIX 5: PRESS RELEASES

Sample press releases

Number 1

Local fishermen and boaters, as well as shipping companies and commercial vessels, will have to start complying with a new international treaty that bans the dumping of plastic in the ocean, said _____, manager of the Port of _____.

Legislation now mandates compliance with Annex 5 of a 1973 treaty that has been signed by most of the world's major shipping nations. The treaty, commonly called MARPOL, prohibits the dumping of plastics in the ocean.

The legislation requires ports to make dumping facilities available for vessels which bring their garbage back from sea, said _____.

The port is seeking volunteers who are interested in exploring how the port can make it easier for boaters, shippers, and fishermen to bring their debris back to shore, said _____.

"We are in the process of making contact with the city council and members of various community groups, asking them to appoint a representative to the committee," said _____. "We'll be setting a meeting date as quickly as possible".

Last year the U.S. produced 50 billion pounds of plastics, about a quarter of it in the form of plastic bottles and containers, said _____. An unknown percentage of the waste material wind up in the oceans.

Studies have shown that merchant ships alone dump 5.7 million tons of mostly plastic litter in the ocean each year, said _____.

In addition, there are thousands of miles of net lost or discarded by fishing fleets, and thousands of crab pots that have been lost by fishermen. The lost gear continues to trap fish and shellfish, said _____.

"We know there must be a halt to the ocean being used as a garbage dump, " said _____. " But by the same token, if we're going to require boats to bring their garbage back to land, we need to provide facilities to help them properly dispose of it."

Each year thousands of marine animals and birds are tnaled in the plastic debris, or die from eating plastic peooets that look like food, said _____. Once plastic is dumped in the ocean it can last 500 years or more without decomposing.

The treaty requires that no plastics, including synthetic netting material and rope, be disposed of in the ocean. Degradable but floating, packing and lining material may not be disposed of within 25 miles of shore, and paper, rags, metal and glass must not disposed of within 12 miles.

Sample press releases

Number 2

Newport Marine Debris Project

Thousands of birds, marine mammals and other animals are killed each year because of plastics thrown away in the ocean, and the Port of _____ wants to play a role in halting that.

Volunteers will meet Wednesday at 8 p.m. at _____ to discuss creation of a port project that will provide facilities for boats to return their garbage to shore for disposal, said _____, port manager.

Under federal law, all ports are required to provide such facilities as the U.S. moves to comply with an international treaty banning the disposal of plastics and other debris in the ocean, said _____.

A representative from the city council, the U.S. Coast Guard and from several community clubs, will be attending the meeting, _____ said. A number of local fishermen and boaters have also expressed interest in the project, he added.

The port intends to launch an educational campaign that will encourage marine users to properly dispose of all garbage in port, instead of in the ocean.

"People have to realize that if they can pack something out onto the ocean, they can pack it back," said _____. "Studies have indicated that more than 80 percent of the ocean garbage is generated by vessels at sea."

Seemingly innocuous items like plastic rings from six-pack containers can mean death to a sea bird, duck or small mammal.

"Once a six-pack ring gets stuck on an animal, there is no way for the animal to remove it," said _____. "As the animal grows, the plastic can cause an irritation and swelling that can lead to a painful death."

Plastic debris also kills thousands of marine mammals, turtles, birds and fish each year, said _____.

"Pellets of plastic look just like bits of food to birds," said _____. "A bird's stomach can be filled with plastic, but the bird won't get any nourishment."

Researchers believe that plastics have played a part in the decline of the northern fur seal population on the Pribilof Islands off Alaska, said _____.

Studies by the National Marine Fisheries Service show the decline over the past decade has been at the rate of 4 to 8 percent yearly, and there are correlations between rates of change in seal pup numbers and incidents of entanglements about seals harvested, _____ said. Blame is generally placed on lost or castoff fishing nets and cargo straps.

But to encourage mariners to bring their trash back to shore, the port must provide convenient disposal and recycling facilities, which _____ said he hoped the volunteer committee would be able to develop.

Sample press releases

Number 3

Newport Marine Debris Project

Recycling plastics and other garbage from the ocean to shoreside facilities not only helps wildlife, it saves money as well, Port of _____ manager _____ said today.

A pilot marine debris project at the Port of Newport on the Oregon coast found that 57 percent out of 102 commercial fishing vessels surveyed reported repairs and lost fishing time because of encounters with marine trash.

The minimum cost associated with the 58 vessels totals \$112,583 and does not include the lost fishing time.

One out of every five sports fishermen surveyed in the Port of Newport study also reported problems with plastic garbage. The average repair bills for the boats was \$100.

The Port of Newport also found that by encouraging mariners to bring their trash back to shore, where it could be recycled or disposed of properly, the port itself was saving money.

"If the Port of Newport can accomplish that, so can we," said _____. The port has formed a volunteer committee that is in the process of determining how to comply with federal legislation that requires ports to provide disposal facilities for marine debris.

The legislation also prohibits the dumping of plastics and other debris in the ocean.

The Port of Newport study was financed by a \$97,000 grant from the National Marine Fisheries Service. The objective was to develop a model that can be used by other ports nationwide.

Recycling is what the Port of Newport has chosen to help dispose of marine debris, said _____. The port has provided containers nears the docks for nets, cable, cardboard, metal and wood. The cardboard and metal are recycled and the burnable scrap wood goes to a local Woodshare program for use by senior citizens.

The net material is used in gardens, as decorations and as volleyball nets, said Fran Recht, manager of the Newport program. The port spends an extra eight hours a month handling the refuse, but Recht estimates the program has saved about \$1,000.

Of the recreational boaters reporting problems, the Port of Newport study found 38 percent had problems with synthetic rope. It often got caught in propellers and rudders, resulting in towed boats, new equipment, bent props and lost fishing time.

Plastic bags can get sucked into boat intakes, causing overheated engines, burned impellers and water pump replacement.

One commercial fisherman surveyed reported two encounters with line in his propeller, costing \$12,000 and \$13,000 in repairs. Another fisherman estimated repairs over a 10-year period at \$40,000.

One-third of the 280 sport fishermen surveyed reported they had seen marine mammals, birds or fish entangled in floating trash.

Sample press release

Number 4

TRASH COMPACTOR AIMED TO END OCEAN POLLUTION

Compactor use on space limited vessels may ease compliance with the upcoming laws prohibiting the disposal of plastics at sea. SEARS is making kitchen sized trash compactors available to all sea-going vessels in the United States at near cost. Vessels owners should contact their nearest Marine Extension Agent or the nearest SEARS Contract Sales Office.

SEARS is making this offer to boats throughout the United States, says Larry Chimenti, Pacific North West Contract Sales Manager, because SEARS is concerned about the marine debris problem. Chimenti noted many marine animals die from entanglement in discarded plastic, and that fish and many birds are known to mistake small pieces of floating plastics for their normal food. "I just saw a picture in our newspaper of a duck entangled in a discarded six-pack ring" said Chimenti. "Many people are unaware of how dangerous even common items can be to animals if improperly disposed of."

"We know many ocean going vessels are very space limited", says Dick Galante, SEARS' national appliance sales manager, "by providing these compactors we are hoping that we can make it easy for vessels to keep their plastics on board." These are kitchen size compactors", Galante noted, "they measure (inches) 34 h x 15 w x 25d, run on 120 volts and are easily mounted in vessels."

Compactors will allow vessels with limited space to contain and store their refuse. Studies were conducted on compactor use by the National Marine Fisheries Service's Marine Refuse Disposal Project. Compactor tests done for this project by the Oregon State University Research Vessel WECOMA indicated

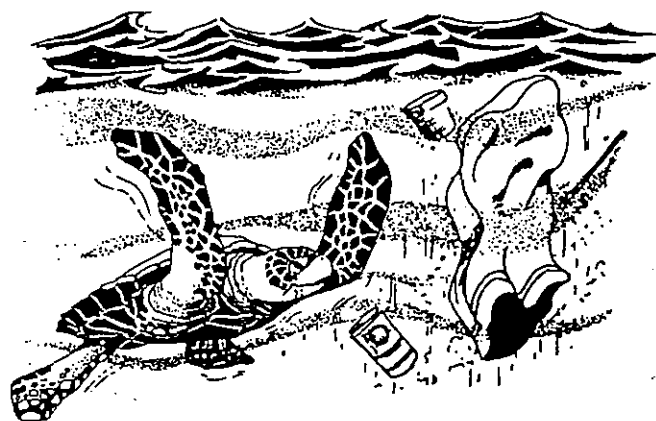
that 50 gallons of uncompacted plastic trash would fit into one small compactor sack. The plastics generated by the WECOMA crew of 30 during a 23 day trip were able to be fit into 5 small bags. These compacted sacks were wrapped in larger trash bags and stacked in a small available space forward of the starboard passage way.

Other tests on the fishing vessels Marathon and Pacific Future at the Port of Newport in Oregon revealed that 4 to 6 kitchen sized bags of mixed trash (plastics, glass, metal, paper) would be compacted into one bag. During a two week trip on the Pacific Future, and a four week trip on the Marathon, only 4 compacted sacks of garbage were generated. Compacted bags were wrapped in plastic garbage bags and stored either alongside the wheel-house or in the fish hold. The compactor on the Pacific Future was mounted in the wheel house, while the Marathon found space for the compactor in the galley.

Captain of the Marathon, Kurt Cochran, recommends the use of compactors to other fishermen. "Because of the long time we spend at sea, this is the only way we're able to keep our plastic garbage on board. It takes a little more time than throwing garbage overboard", says Cochran, "but we're aware of the litter problem now and we're going to help get our ocean cleaned up".

Sample press release

Number 5

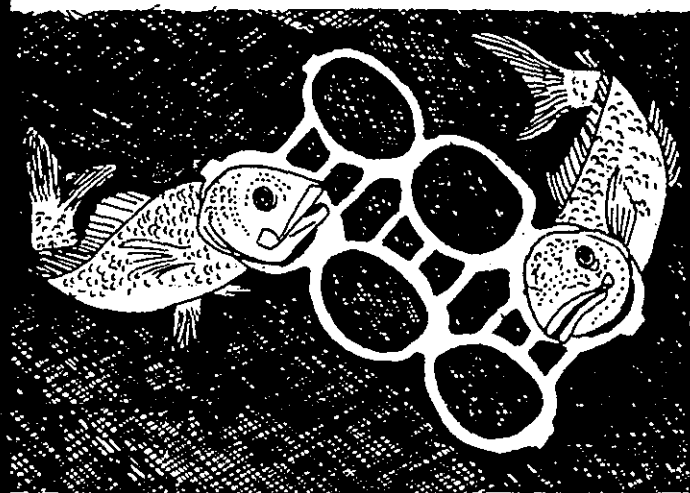


Se ha descubierto que los despojos plásticos están causando daño y hasta muerte a una gran cantidad de animales marinos que la confunden con comida o se entrampan en ella. Los plásticos pueden llegar a ser tan mortíferos para los mamíferos marinos como lo son los derrames de petróleo, metales u otros materiales tóxicos.

Los contribuyentes más grandes a esta contaminación plástica son los barcos mercantes que navegan los mares. La Academia de Ciencia de Estados Unidos, concluyó, mediante un estudio, que se tiran al mar unos 6.6 millones de toneladas de basura cada año. Unos 639,000 envases plásticos y bolsas son tiradas al mar todos los días.

Los pescadores comerciales también contribuyen en gran medida a esta mortandad. Se estima que 150,000 toneladas de equipo de pesca plástico se pierde o se bota al mar anualmente. Los dueños de botes y bañistas se añaden a la lista contribuyendo con bolsas de emparedados, vasos de "styrofoam", cubiertos de plástico, y las ataduras plásticas de latas de refrescos y cervezas. Alcantarillas que vacían al mar también contribuyen a aumentar este problema.

Quizás la forma de basura plástica más extendida sea las pequeñas bolitas de polietileno utilizadas en la manufactura de artículos plásticos. En una investigación se calculó que una milla cuadrada del Mar del Sargaso, al sureste de Florida y norte de Puerto Rico, contenía entre 8,000 a 10,000 bolitas flotantes de este material. Un biólogo pesquero aseveró recientemente que casi sin excepción, las encuestas señalan que de los productos hechos por el hombre y encontrados en el mar, el plástico suma más de la mitad.



BASURA PLASTICA AMENAZA VIDA MARINA

Por: Vangie Fradera de Hernández

La basura está inundando nuestros mares y nuestras playas. Aparte de que esta basura es indiscutiblemente ofensiva a la vista, el problema va más allá de lo estético.

¿Cómo afecta el plástico a la vida marina?

Los mamíferos marinos, las tortugas y las aves son las más afectadas. Un estimado reciente señala que en las islas Pribilof, alrededor de 50,000 focas mueren cada año enredadas en mallas de plástico, o bien mueren exhaustas al querer nadar con sus aletas enredadas, o su habilidad de cazar comida es restringida.

Cualquier material transluciente o membrana delgada que pueda ser confundido con una aguaviva, es mortífero para las tortugas, ya que éste es uno de sus alimentos preferidos. También, las bolsas plásticas al igual que las "Tee's", que sostienen las bolas de "golf", forman un tapón letal en el tracto digestivo del animal.

Se sabe que por lo menos unas 42 especies de aves marinas comen plástico. En las islas Midway, de unos 50 albatroses encontrados muertos o gravemente enfermos, 45 habían ingerido alguna forma de plástico. En varios de ellos, el plástico había obstruido el tracto digestivo o causado úlceras. En los estómagos de estas aves, se han encontrado desde soldaditos de juguete hasta plumas de escribir, flotadores de líneas de pescar y fichas de jugar póker. Hasta las gaviotas, que tienen la habilidad de vomitar comida non-grata, no son inmunes a la amenaza plástica. Se ha encontrado muchas estranguladas con las ataduras plásticas de latas de refresco.

Los esfuerzos para reducir la cantidad de plástico arrojado al mar, han sido infructuosos. A pesar de que Estados Unidos y 59 otras naciones acordaron en 1972 prohibir el arrojar al mar plástico duro, entre otras sustancias, el tratado falló en incluir arrojar al mar basura ordinaria o común, la cual contiene grandes cantidades de efectos plásticos.

Diez estados de los Estados Unidos ya ha legislado requiriendo que las ataduras plásticas de refrescos sean hechas de un plástico que se desintegre rápidamente bajo el sol.

A pesar de esto, la basura plástica está creciendo desmesuradamente año tras año, en proporciones monstruosas.

Por esta razón - "la ley empieza por casa" - el Programa Sea Grant de la Universidad de Puerto Rico, a través de su proyecto de Asesoría Marina realiza actividades, tales como: coordinación e instalación de drones para basura en villas pesqueras junto a la agencia CODREMAR; organiza y educa a grupos cívicos y personas interesadas en la participación de proyectos de limpieza de playas y concientización de la comunidad sobre la importancia de un ambiente mejor.

Para más información, llame o escriba a:
Programa Sea Grant
RUM-UPR
P.O. Box 5000
Mayaguez, Puerto Rico 00709-5000
Tel. 832-4040, Exts. 2521, 3533

NOTA:

Efectivo en Diciembre de 1988, el tratado MARPOL ANEXO V prohíbe (a los Estados Unidos y las otras 26 naciones firmados) el arroyo de cualquier tipo de material plástico al mar. También requieren que los puertos ofrezcan facilidades y servicios que permiten la disposición mas fácil de basura cuando regresan los marineros al puerto.



When it's done holding your ship's garbage, it could hold death for some marine animals.

This plastic trash bag may not look like a jellyfish to you. But to a hungry sea turtle, it might. And when the turtle swallows an empty bag, the mistake becomes fatal.

The problem is more than bags. Plastic six-pack holders sometimes become lodged around the necks and bills of pelicans and other seabirds, ultimately strangling or starving them. Other plastic refuse, either through ingestion or entanglement, causes the deaths of thousands of seals, whales, dolphins and other marine mammals every year.

Plastic debris also causes

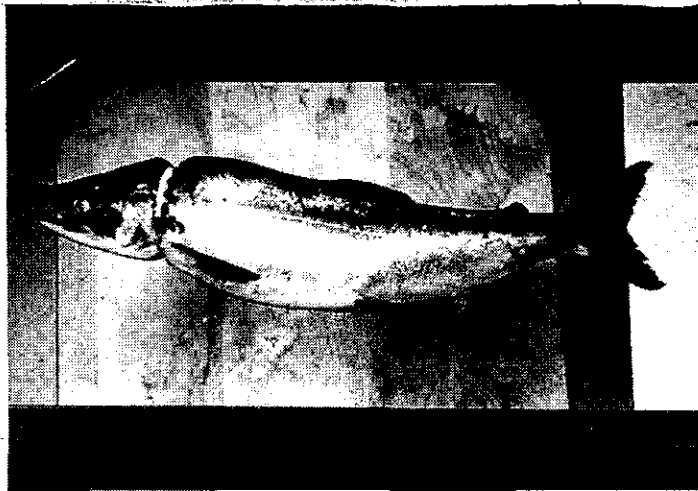
costly and potentially hazardous delays to shipping when it fouls propellers or clogs intake ports.

It's a critical issue, destined to attract public and government scrutiny if we fail to take action to solve it.

So please, stow your trash, and alert your shipping terminals that you will need proper disposal on land. A sea turtle may not know any better. But now, you do!

To learn how you can help, write: Center for Environmental Education, 1725 DeSales Street, N.W., Suite 500, Washington, D.C. 20036.

A public service message from:
The Center for Environmental Education
The National Oceanic and Atmospheric Administration
The Society of the Plastics Industry



a.



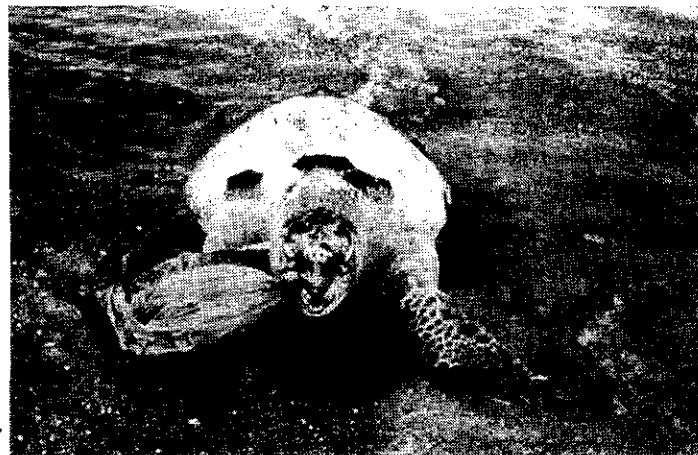
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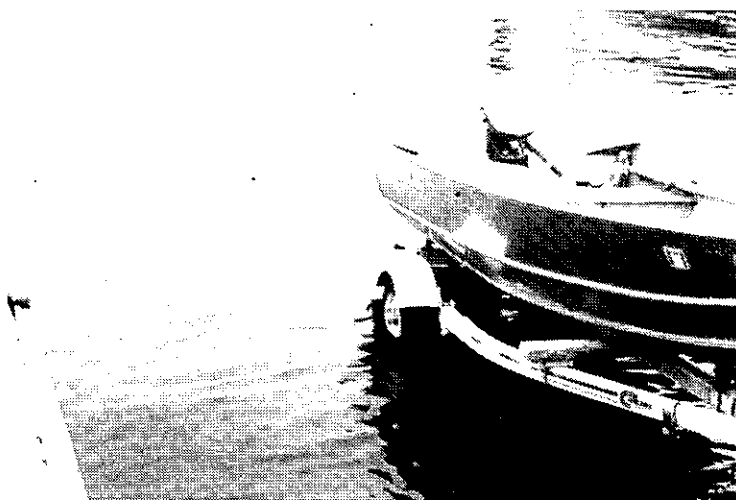


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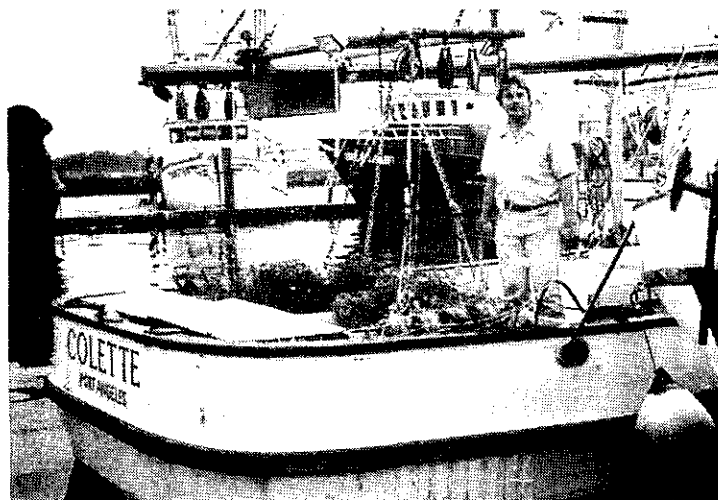
PHOTOGRAPHS FOR USE WITH PRESS RELEASES (or other purposes)
 (Please give credit to photographers)

Figure 5. Fish and wildlife are hurt by entangling in or ingesting plastics.

- a. Salmon caught in plastic band — photograph by Cecil Ranney.
- b. Sea lion collared by six pack yolk — photograph by George Antonelis.
- c. Turtle eating plastic bag which it mistakes for its jellyfish prey — photography by Rex Herron.
- d. Gray whale caught in piece of gill net — photograph by Pierce Harris.
- e. Mallard duck entangled in a six pack yolk — photograph by Neil Maine.
- f. Sea lion cut by plastic band — photograph by Roy Lowe.



a.



b.



c.



d.

PHOTOGRAPHS FOR USE WITH PRESS RELEASES (or other purposes)

Figure 6. Vessels are damaged and safety threatened when plastic debris entangles in gear, propellers, or engines. Compactors may help vessels solve the problem of limited storage space for refuse. (All photographs by Fran Recht).

- a. Floating plastic bags often get sucked up into engine intakes, disabling vessels.
- b. A net piece became wrapped around this vessel's propeller resulting in a 12 hour tow to port and \$5,000 worth of lost fishing time.
- c. A small trash compactor mounted in the galley of larger vessels is effective for dealing with lack of storage space for those long trips to sea.
- d. A 4:1 or 5:1 reduction in refuse volume is obtained by using a trash compactor. Full compactor bags are small and can be easily stacked and stored.

APPENDIX 6: BEACH CLEAN-UPS AND OTHER ACTIVITIES

BEACH CLEAN-UP

EXPLANATION: Plastics and other refuse float onto our beaches or are left behind by beachgoers. Plastics items and pieces are of special concern since they are persistent and are known to cause harm to wildlife. Many sea animals as well as shore birds mistakenly eat plastics and many marine animals die from entanglement in plastic items. Besides aesthetic impacts, people too may be harmed by refuse, when they are cut by broken glass and metal or when boat problems result from refuse at sea. Trends in ocean pollution may be seen by keeping systematic records.

MATERIALS NEEDED: pencil, beach survey form, litter bag, clipboard

PROCEDURE:

- 1) Locate a section of beach with easily identifiable boundaries. A beach with a jetty on one end, a pile of rocks or log jams, etc.
- 2) Label your survey form: Name, Date, Type of beach, Description of beach survey location (be specific so another sample can be taken from that same area.)
- 3) To take your sample:
 - A. Read through the survey form so you know the different categories of trash.
 - B. Walk between your boundary "markers".
 - C. Put each piece of trash you see into your bag.
 - D. Put a tally mark in the correct category on your survey sheet for each piece of litter picked up.
(It is easiest to do this survey working in pairs. Have one person carry the survey the place the tally marks while the other picks up the trash and calls out the trash category as they put it into the litter bag. Make sure each piece picked up gets a tally mark.)
 - E. For synthetic pieces smaller than a quarter, estimate the number and record it under "other", specify "small pieces" under the appropriate plastic or styrofoam column.
 - F. When you have completed your section of beach, fill out the rest of the survey form. Note the total trash collected (number of bags full, give a poundage estimate as well), note any entangled wildlife seen, unusual items, and any comments such as weather conditions or general condition of beach.
- 4) Dispose of your trash in the nearest dumpster.
- 5) Summarize your data: Add together numbers of items in each category, ie. metal, plastics. (To find percentage of plastics and styrofoam in your sample, total the numbers of all plastic and styrofoam items collected, then divide by the total number of all items collected, then multiply by 100.)
- 6) Give the survey form to the beach clean-up coordinator.
- 7) Do this clean-up on a regular basis and keep your local newspaper informed of your results and the changes over time.

NOTE: For those clean-ups with a large number of participants make a copy of the summarized results from all participants in the beach clean-up and send to The Center for Environmental Education, Beach Clean-up Data Base. 1725 DeSales St, NW, Suite 500, Washington, D.C. 20036, 202-429-5609.

ITEMS COLLECTED

You may find it helpful to work with a buddy as you clean the beach, one of you picking up trash and the other taking notes. An easy way to keep track of the items you find is by making tick marks like this:

bags |||| |||| |||| ||| Total
18

cups |||| |||| |||| |||| || Total
22

	Total number of items
PLASTIC	
bags	<input type="text"/>
6-pack holders	<input type="text"/>
bottles:	
green	<input type="text"/>
soda	<input type="text"/>
other	<input type="text"/>
cups, utensils	<input type="text"/>
caps, lids	<input type="text"/>
strapping bands	<input type="text"/>
large sheeting	<input type="text"/>
fishing net	<input type="text"/>
buckets	<input type="text"/>
"write protection"	
rings	<input type="text"/>
hardhats	<input type="text"/>
vegetable sacks	<input type="text"/>
milk jugs	<input type="text"/>
egg cartons	<input type="text"/>
toys	<input type="text"/>
fishing line	<input type="text"/>
gloves	<input type="text"/>
rope	<input type="text"/>
light sticks	<input type="text"/>
diapers	<input type="text"/>
disposable lighters	<input type="text"/>
syringes	<input type="text"/>
plastic tampon applicators	<input type="text"/>
other (specify)	<input type="text"/>
	<input type="text"/>

GLASS	
bottles	<input type="text"/>
light bulbs	<input type="text"/>
fluorescent light tubes	<input type="text"/>
pieces	<input type="text"/>
other (specify)	<input type="text"/>
	<input type="text"/>

	Total number of items
STYROFOAM	
cups	<input type="text"/>
buoys	<input type="text"/>
pieces	<input type="text"/>
other (specify)	<input type="text"/>
	<input type="text"/>

METAL	
wire	<input type="text"/>
beverage cans	<input type="text"/>
bottle caps	<input type="text"/>
pull tabs	<input type="text"/>
other cans	<input type="text"/>
large containers	<input type="text"/>
drums: rusty _____ new _____	<input type="text"/>
pieces	<input type="text"/>
other (specify)	<input type="text"/>
	<input type="text"/>

PAPER	
bags	<input type="text"/>
cups	<input type="text"/>
cartons	<input type="text"/>
newspaper	<input type="text"/>
pieces	<input type="text"/>
other (specify)	<input type="text"/>
	<input type="text"/>

WOOD (do not include driftwood, twigs, etc.)	
pallets	<input type="text"/>
crates	<input type="text"/>
pieces	<input type="text"/>
other (specify)	<input type="text"/>
	<input type="text"/>

RUBBER	
tires	<input type="text"/>

OVER

WE WANT YOU TO BE SAFE

6. Don't lift anything too heavy.
 5. Watch out for snakes.
 4. Stay out of the dune areas.
 3. Wear gloves.
 2. Be careful with sharp objects.
 1. Do not go near any large drums.

SAFETY TIPS

How did you hear about the cleanup?

Location of beach cleaned

Nearest city

Today's Date:

Month

Day

Year

Name of your area coordinator

Age:

M

F

Occupation

Address

Zip

Phone

Affiliation

Name

- Directions

 1. Complete the information below.
 2. Open card to record items collected during cleanup.
 3. After the cleanup answer the questions on the back of this card and return to area coordinator or CEE in Austin.

BEACH CLEANUP DATA CARD

COMPLETE THIS PORTION AFTER CLEANUP

Estimated miles of beach cleaned

 Number of bags filled

We are particularly interested in identifying the SOURCES of marine debris. If possible, please list all items that have labels or company names.

EXAMPLE:


CLARASOL (green plastic Bottle)

OBSERVATIONS OF STRANDED AND/OR ENTANGLED ANIMALS (Please describe type of animal and type of entangling debris. Be as specific as you can.)

What was the most peculiar item you collected?

Comments

PLEASE RETURN THIS CARD TO YOUR AREA COORDINATOR OR MAIL IT TO:



Center for
Environmental
Education

1725 DeSales Street, N.W.
 Washington, D.C. 20036

Studying Plastics on Your Beach
THE ONE SQUARE METER SAND SURFACE SAMPLE

EXPLANATION: Small plastic pieces that float in the ocean are carried to beaches by tides and wind. These are mistaken for food by fish, surface feeding sea birds, and shorebirds. This is cause for concern. Though tides and currents vary over the days, months, years; the trends in ocean plastic pollution may be seen by keeping systematic records.

MATERIALS NEEDED: meter stick
pencil
ziploc bag or other container to hold your sample
3" x 5" index card
small notebook

PROCEDURE:

- 1) Locate a tide drift line on your beach (in a beach area located between the extreme tide heights) where you have noticed plastics accumulating.
- 2) Label your 3x5 card with the following words, put each word on a different line so as to leave plenty of space after each word to enter information:
"NAME:" "DATE:" "TIME:" "TOTAL COUNT:" "LOCATION"*

(* Description of location where sample is being taken. Be as specific as possible so another sample could be taken at that same spot.)

- 3) To take the sample:
 - A. Lay out a square one meter on each side.
(Lay down your meter stick, mark each end with a stick or rock. Starting from here measure another length, put another marker in place, continue until you have a square with four equal sides (each side should be a meter long).
 - B. Count every piece of plastic or styrofoam NO MATTER HOW SMALL. Just pick up material off the SURFACE of the sand. When you have a handful, empty it into your bag and write down the count on the back of your card (the side without your writing) and continue picking up and counting the plastics.
- 4) When you have picked up every piece compute your total count and note this on the front of your card as "Total Count".
- 5) Record in your notebook all the information on the front of your card. Enclose the 3 X 5 card inside the ziploc bag with your plastic pieces and store the samples for later comparisons.

NOTE: It is suggested that you do this sample on a monthly or bimonthly basis.

You may want to keep your local newspaper informed of your results and changes over time.

Activity: Plastic Jellyfish

from Project WILD Aquatic Education Supplement
copyright 1986 Western Regional Environmental Education
Council

Objectives: Students will be able to: 1) evaluate the potential effects of plastic waste on aquatic wildlife; and 2) identify specific actions they can take to help remedy the problem.

Method: Students monitor the plastic waste production in their own households, research its effect on marine life, and propose various ways to lessen the problem.

Background: See the article "Plastics in the Marine Environment" on page 20 of this issue of CLEARING.

Materials: Plastic waste from home

Procedure: 1. Ask the students to collect and save every piece of plastic waste produced in their homes for a two-day period. Have them bring these materials to school. Caution the students to clean the plastics before bringing them to school so that they are free of food or drink remains. Also caution them about toxins such as ammonia, chloring bleach, etc., which may be in the containers. These should be emptied and rinsed completely.

2. Ask the students to separate these plastic waste materials into categories. Have them classify them in terms of how they might be perceived by aquatic wildlife as food, e.g., very likely to be perceived as food, somewhat likely, or unlikely. Identify the species which might attempt to eat the plastic. Also classify the materials according to the likelihood of aquatic animals becoming entangled with them and subsequently dying.

3. Ask the students to hypothesize about how these materials might affect aquatic animals. Have them check their hypotheses against current findings reported in the literature, or provide them

with sufficient information to do so. Ask the students to summarize what they have learned about the potential hazards to aquatic wildlife from plastic waste materials.

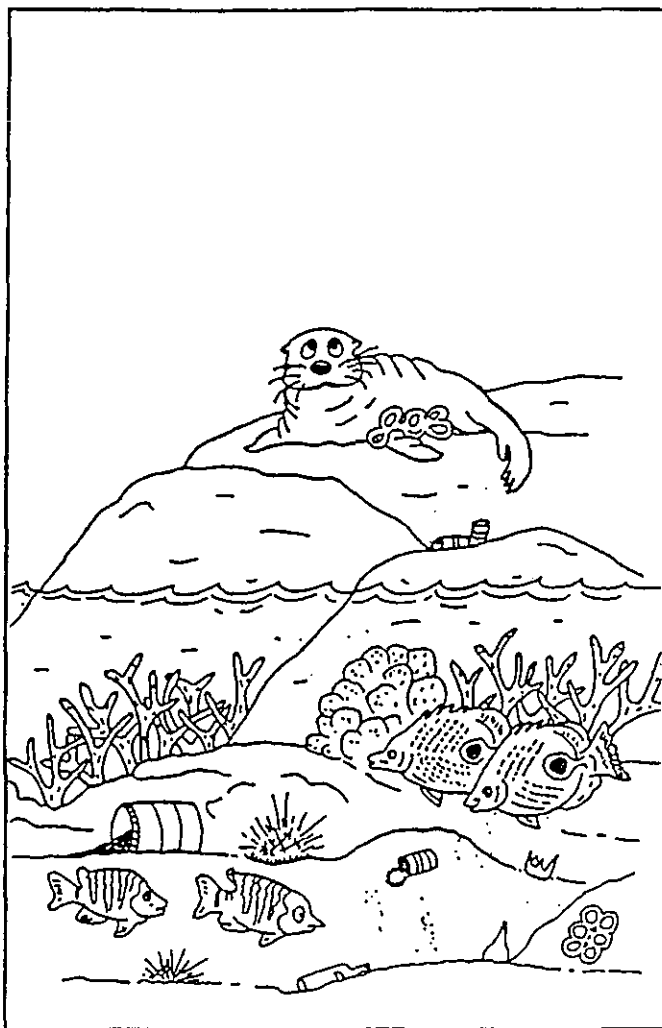
4. Invite the students to survey their community for plastic litter. Look to see if and where it exists. Investigate its potential negative impact on animals in the community. If there is damaging plastic litter in the community, ask the students to create an action plan to help take care of it.

Extensions

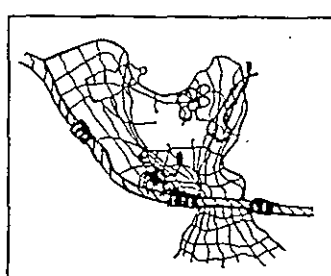
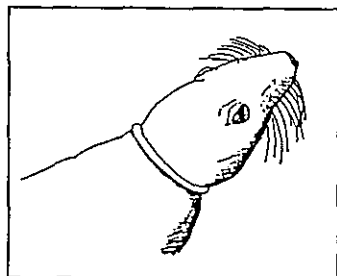
1. Contact local environmental, conservation, animal welfare, and wildlife groups to see what is being done about the impact of litter on local wildlife and if specific help is needed.

2. Establish a litter patrol. Designate specific targets such as nearby beaches, lakes, and stream beds. Establish scheduled tours of these areas to pick up plastic and other forms of litter.

3. Write a plastic consumption conservation plan! If it seems appropriate, see if you can break some of your own plastic habits. Consider whether your own uses of plastics could be potentially damaging to wildlife as well as wasteful of natural resources.



Plastics in the Marine Environment



*"Each Man Kills What He Loves Best
Some Do It With A Sword, Some With A Pen..."*

-Oscar Wilde

Alonzo T. Pruter

The ever increasing production of plastics is resulting in growing widespread distribution of these persistent materials at the surface and global margins of the world's oceans. The largest inputs of plastics are from ship-generated litter, litter carried to sea by rivers and drainage systems, and litter left behind by beachgoers. Convenience items, packaging materials, fishing gear, and raw plastics comprise most of the synthetic materials entering the oceans.

While further studies would be required to understand all of the biological impacts of plastics on marine life and seabirds,

especially at population levels, their physical effects are often very apparent. Birds can become entangled in lines, net fragments, and "six-pack holders." Some species of seabirds swallow plastics which can lead to blockage of the intestine or ulceration of the stomach. The greatest threat to seals and sea lions appears to be from becoming entangled in lost or discarded fragments of nets, pieces of rope, and uncut bands used to strap boxes and other cargo. "Choke collars" of fish net and uncut strapping bands along with other forms of entanglement are believed to be responsible for approximately 50,000 deaths a year of the northern fur seals of the Pribilof Islands in the eastern Bering Sea.

The stomachs of some fishes, including juvenile flounders off the U.S. Atlantic coast, have been observed to contain large numbers of plastic pellets. Underwater observations of derelict ("ghost") gillnets have shown they can continue to catch fishes, crabs, diving seabirds, and other forms of marine life for several years after they are lost.

Ingestion of plastics and entanglement

in lines and net fragments can also injure or kill sea turtles. Turtles are known to swallow a variety of synthetic drift objects, including plastic bags and sheeting they may mistake for a normal food source.

Seafarers and fishermen are directly impacted by plastic debris when rope or derelict fish net entangles and damages propellers and rive shafts, or clogs sea intakes and evaporators. Besides endangering lives, such occurrences can cause economic losses in the form of costly tows to port, repairs, and lost time.

According to estimates made over a decade ago, more than 6 million metric tons of man-made debris was being discharged into the world's oceans each year from merchant ships, passenger ships, naval vessels, fishing vessels, pleasure boats, and offshore oil platforms and drilling rigs. With the increases in vessel traffic, the amount of debris is probably greater today. And to make matters worse, a larger proportion of the debris now probably consists of plastic products.

Plastics in the Marine Environment (continued)

The shift from the use of natural fibers to longer-lasting synthetic fibers for the construction of nets, lines, and other fishing gear has caused commercial fisheries to become a large contributor to plastic pollution. Fishing gear can become a pollutant as a result of accidental losses (fishery-generated) or from dumping (crew-generated). Although the amount of lost and discarded fishing gear is not precisely known, some investigators believe that worldwide it may amount to over 100,000 metric tons per year. Commercial fishing vessels are a source of discarded bottles, bags, sheeting, styrofoam cups, six-pack holders, and other plastic objects.

Recreational fishing also generates large amounts of plastic litter, especially in the U.S. where in 1985, 80 million angler visits were made to marine waters. Whether done from shore, piers, or boats, sport fishing is a frequent source of discarded bait trays, bait bags, worm or snarled line, and a variety of plastic convenience products.

In heavily used coastal areas, beachgoers can generate large amounts of plastic litter. For example, the 70 million people who annually visit beaches in Los Angeles County, California, are reported to leave some 75 tons of trash on the beaches every week.

The plastics industry is a direct source of pollutants in the form of pellets, the raw material or feedstock used by the manufacturers of plastic products. These tiny pellets enter the ocean via rivers and outfalls of plants that manufacture them or from trucks, trains, and ships during loading, transport, or unloading.

Contributors to plastic pollution also include people who never go to sea or visit beaches. Plastics are part of the solid waste generated on land and dumped at sea and part of the trash being transported to the ocean by rivers and municipal drainage systems.

Because plastics in the oceans is a global problem, solving it will ultimately require the efforts of all countries, including perhaps international regulations. But international regulations

governing the disposal of plastics are not yet in place and, even if they were, there remains the question of how effectively they could be enforced.

In the meantime, here are some suggested ways to help combat the problem of plastic pollution.

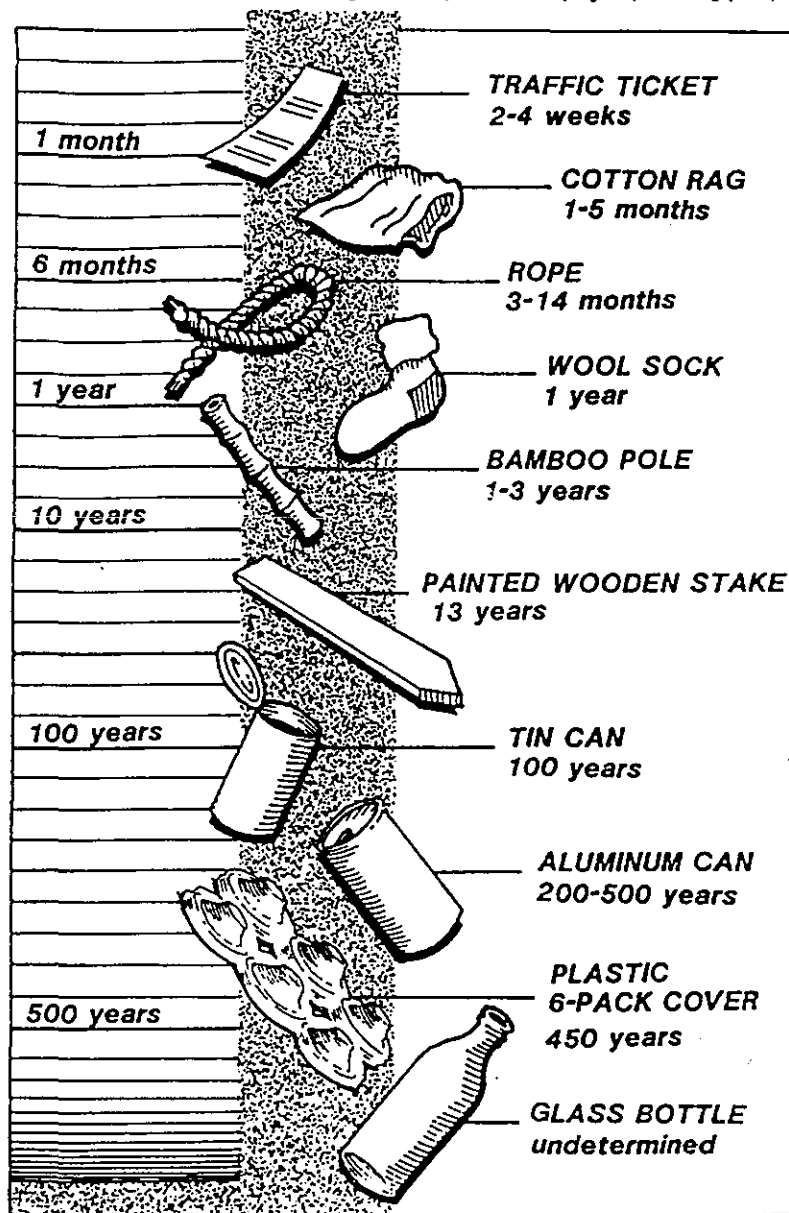
- Take the minimum amount of non-degradable products on board vessels and to beaches.
- Use bulk containers for drinks and other products to better control and manage their disposal.
- Make maximum use of disposal technology, including the compaction and incineration of waste aboard vessels large enough to accommodate such facilities.
- Retain net fragments, fish line, bait bags, plastic convenience products, and other kinds of potentially harmful debris for disposal ashore, preferably at recycling stations. For ports without such facilities, encourage authorities to provide them.
- If possible, bring ashore for disposal any derelict fishing gear encountered at sea. If derelict gear must be returned to the sea, dispose of it in a responsible manner by rendering it incapable of catching or entrapping marine life or birds.
- Encourage anti-litter efforts, including the placement and use of trash cans on beaches and at marinas.
- Support and participate in volunteer litter clean ups of beaches.

Alonzo T. Pruter is a fishery biologist and partner with Natural Resources Consultants, 4055 21st Avenue West, Seattle, Washington 98199. This article was reprinted from Fisheries, Vol. 12, No. 1.

Chart used with permission from *A-Way With Waste*; Second Edition; Washington State Department of Ecology with information from the Book of Lists 2.

Enduring Litter

Litter at the roadside is ugly. How long it will stay before decaying may be an ugly surprise.



Activity: Where Is "Away?"

Rationale: The garbage or trash that is found on our beaches will decompose naturally in time and many people will dump their materials with this rationale. But the amount of time this takes and the volume of trash is turning many beaches into an eyesore and creating an environmental hazard.

Subject: Science, Social Studies

Grades: 4-12

Learning Outcome: Students will recognize the quantity of trash that accumulates on the shoreline, and the time it takes that trash to decompose.

Materials: Scale (fishing type that weighs hanging items), collecting bags (Plastic? not a good example, better to use paper, reusable cloth or burlap), marking stakes, "Enduring Litter" chart from *Away With Waste* curriculum (note on chart: the plastic 6-pack cover is NOT the 6-pack plastic retaining rings, the one pictured is rigid plastic).

Activities: 1. Divide the group into teams to collect different materials, one for plastics, one for paper, one for wood, etc. Give each group a collecting bag.

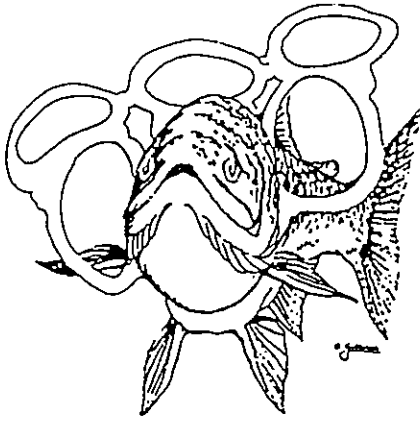
2. Choose a stretch of beach or streambank on which to collect. You may want to use a measured distance so that students can compute the amount of trash per mile.

3. Have each team walk along the beach and collect the material they were assigned to find.

4. Back in the classroom, have the students weigh the different types of trash and compute the approximate amount in one mile of beach. Have the students estimate how long each material will take to decompose over time. You may need to discuss what decomposition is and how the process takes place.

5. Time Capsule - If you have a place in the school yard, or in a generous local parent or teacher's yard, bury each material in a marked spot for retrieval at a given time (perhaps do this at the beginning of the school year, and dig up near the end of the year). The decomposition times can then be compared to the students' predictions. For the remaining materials that have not decomposed, have students construct a time line showing total decomposition of the materials.

Created by Holly Anne Foley, Marine Science Center, Poulsbo, Washington.



Activity: Putting Your Product in a Package

Rationale: Packaging is the largest single component of household solid waste. Many materials produced for the market place, however, need to be packaged in order to protect them during shipping. At the retail outlet, packaging serves to advertise products, identify contents, and may be required to meet regulatory standards.

Subject: Consumer Education, Business, Economics, Design, Industrial Arts.

Grades: 7-12

Learning Outcome: Students will understand some of the benefits and drawbacks of packaging. By examining packaged products students will understand the function packaging plays in protecting and marketing products. Students' design of packages will reflect their awareness of the waste reduction and resource conservation consequences of packaging decisions.

Materials: A collection of packaged products brought to school by students. List of functions/benefits and drawbacks of packaging (see inset). Materials for design/construction of prototype packages (cardboard, paper, colored pens, etc.)

Learning Procedure: 1. Teacher or students bring to class products gathered from the home that represent a variety of packaging styles.

2. Divide students into groups. To a group, distribute all products in one category (eg., cosmetics, food, household products, etc.).

3. Ask students to select a product that they would like to design a new package for.

4. Discuss with students the functions/benefits and drawbacks list.

5. Ask students to list the function and design considerations they feel are important in designing the packaging of the products they are examining. Ask: Why did the producer package his product this way? How else might this product have been packaged?

6. Ask students to identify the packages which could be reused or recycled.

Ask: How can we reuse or recycle the packaging materials after we have used the products?

Ask: What will happen to the packaging we cannot reuse or recycle?

Ask: How can we as consumers reduce the 4.6 pounds of waste we, as individuals, produce every day?

7. Have students develop design specifications for the packaging they will create. Challenge students by explaining their designs must include considerations of waste reduction, reuse, and recycling, as well as public safety, product protection, shipping weight, cost of packaging material, advertising, and public demand.

8. Ask students to identify the product they wish to design a new package for.

9. Share with students the materials you have provided for designing and making prototype packaging for their products.

10. Ask students to present drawings/prototypes to the class and explain the reasoning for their design.

Functions/Benefits of Packaging

- preservation and protection of contents
- sanitation and safety
- identification of product
- prevention of theft
- provides instruction as to content and use of product
- compliance with regulatory standards
- provide employment
- increased profits

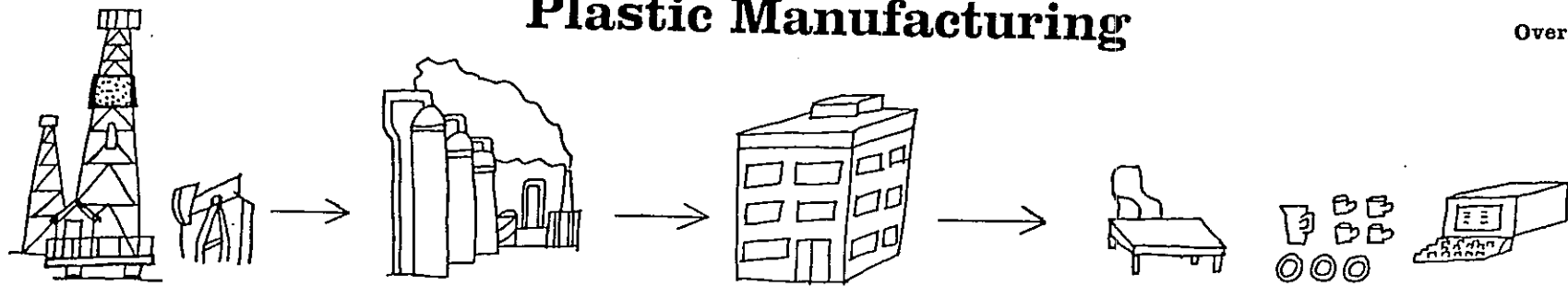
Drawbacks of Packaging

- packaging contributes heavily to our growing problem of solid waste
- if not reused or recycled, the energy and natural resources that go into packaging are lost forever in landfills
- packaging may create false impressions of the quality and amount of the product contained within
- increased cost to the consumer

Used with permission from A-Way With Waste; Second Edition, Washington State Department of Ecology.

Plastic Manufacturing

Overhead 5

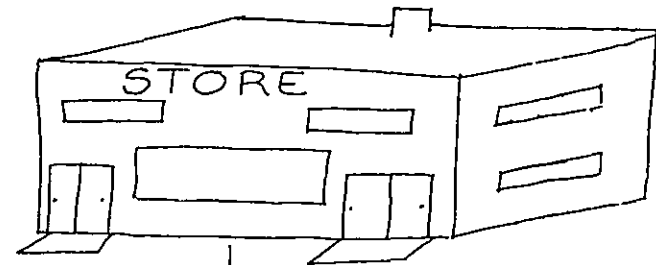
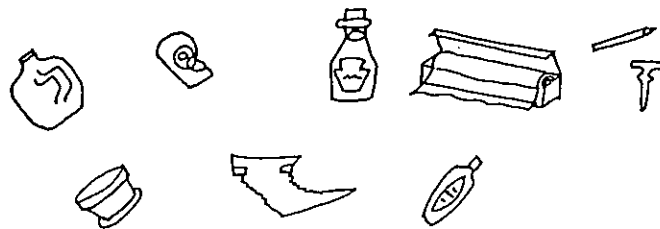


Fossil fuels (oil) and natural gas are refined and changed with heat and chemicals to make resins.

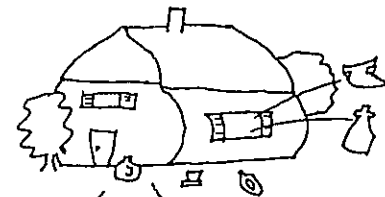
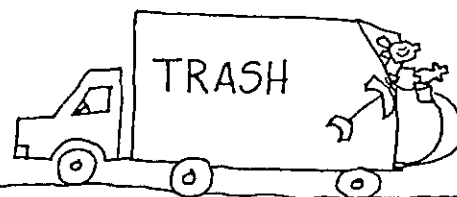
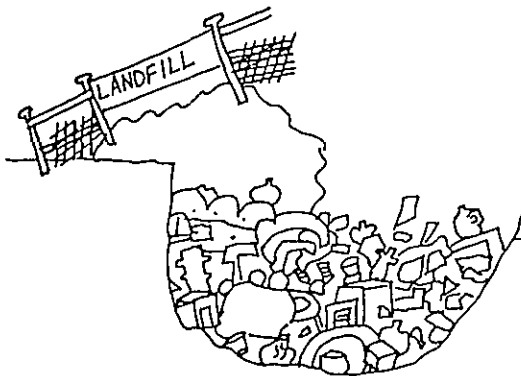
Resins make ...

Thermoset plastics
(permanently shaped)

Thermoplastics



98-99% of all plastics
are thrown away.



Some plastics
are burned to
recover their
energy.



RE: THINKING RECYCLING
Oregon Department of Environmental Quality
Hazardous and Solid Waste Division
Waste Reduction Section
811 SW 6th
Portland, Oregon 97204

SHOW CARE FOR WILDLIFE KEEP PLASTIC ON BOARD



**THE PORT OF NEWPORT
ENCOURAGES ALL BOATERS
TO HELP PROTECT
THE MARINE ENVIRONMENT
BY KEEPING REFUSE ON BOARD.**

**CONVENIENT GARBAGE FACILITIES
ARE PROVIDED
FOR ALL OUR MOORAGE HOLDERS
AT SOUTH BEACH MARINA AND
AT OUR COMMERCIAL DOCKS.**

FISHERMEN:

PLEASE TRY TO BRING ALL **PLASTIC** ITEMS BACK TO PORT.

LARGE PIECES OF UNWANTED **NETTING, LINE, CABLE** (COILED AND TIED) , **WOOD, & METAL** CAN BE LEFT IN THE AREA PROVIDED (FOR BOAT GENERATED WASTE REFUSE ONLY) NEAR THE HOIST DOCK.

Please inform the Port office (265-7758) that you are doing so. We need to know which items are unwanted. You will be charged for use of the hoist but not for disposal of these items .

THERE IS A **WASTE OIL REPOSITORY** FOR YOUR USE IN THIS HOIST DOCK AREA.

MOST OF YOUR **FISH PROCCESSORS** ARE WORKING WITH THE PORT TO ASSURE YOU OF CONVENIENT WASTE DISPOSAL FACILITIES FOR BAGGED REFUSE .

If you have special refuse disposal needs or ideas of how we can improve our refuse services, contact the port office.

Thank-you.

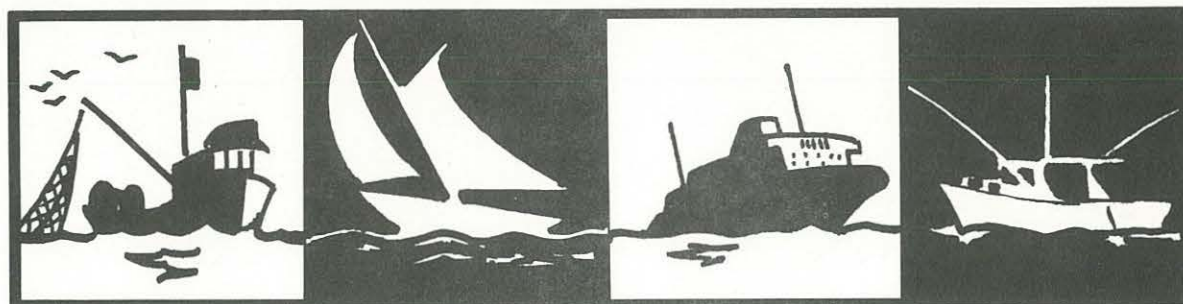
FOR WILDLIFE AND THE ENVIRONMENT



**GET THE DRIFT
AND BAG IT!**



**SHOW CARE FOR WILDLIFE
KEEP PLASTIC ON BOARD**



IN YOUR WAKE

What do you leave
in your wake?
The choice is many,
few stop to think.

A sparkling trail
on a shining sea,
gone in a trice
to eternity?

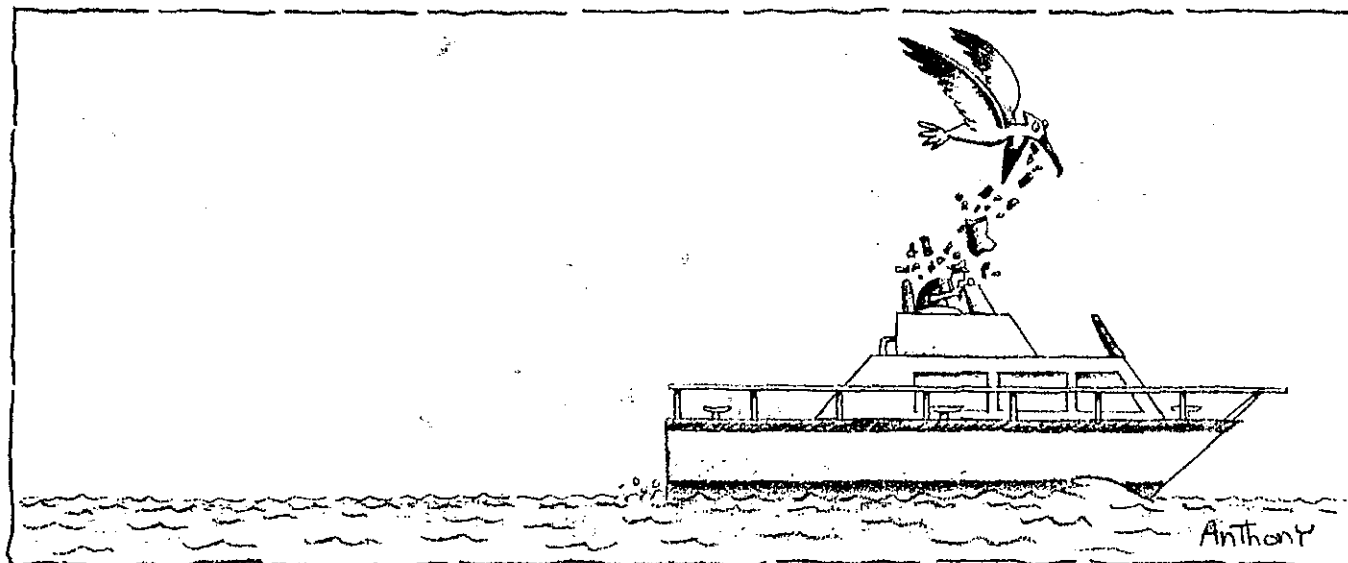
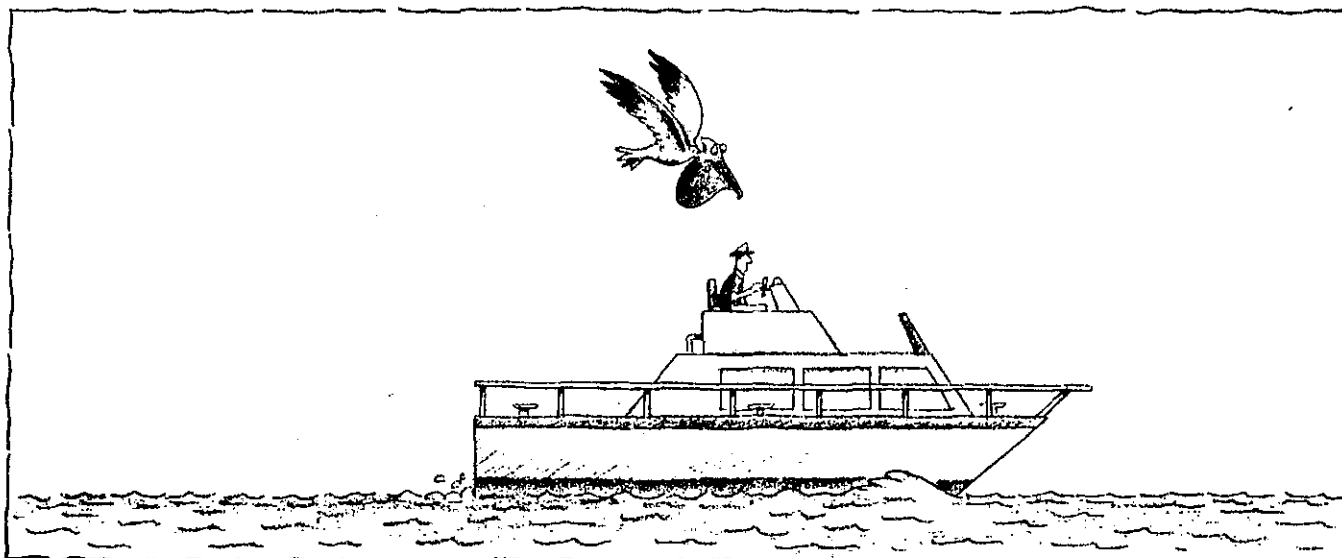
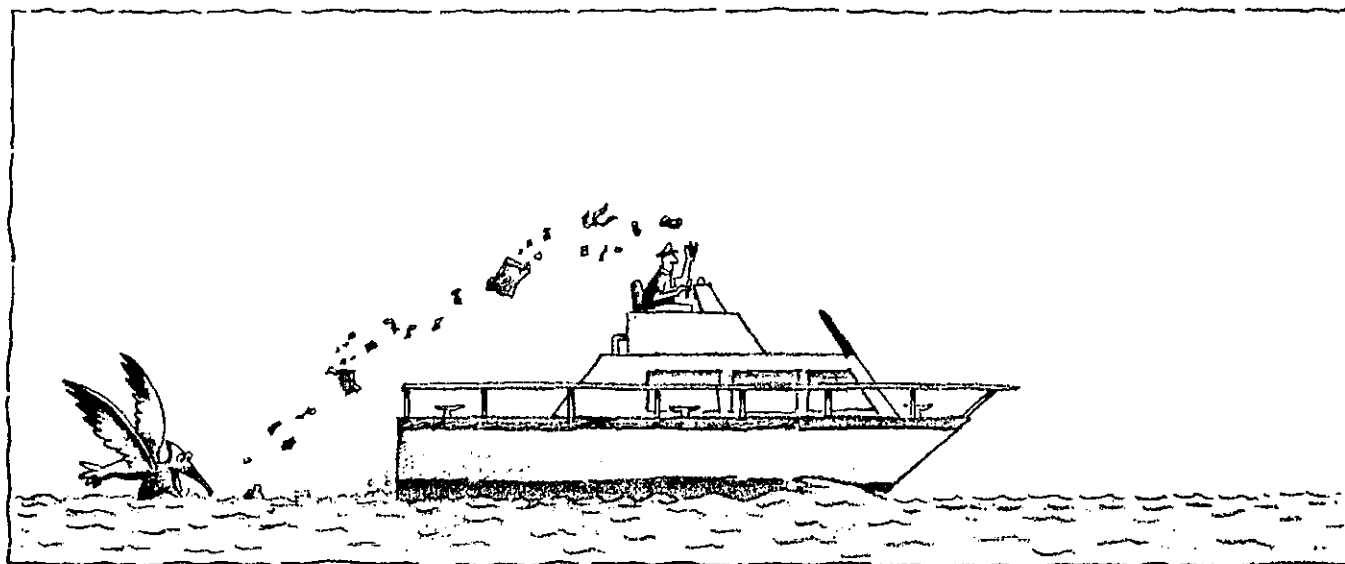
Or a beer can track
that staggers along
to mar and foul
a virgin beach?

Or do you leave
the plastic debris
of the packaged world
to smother a bird,
kill a fish,
foul a prop.,
or litter a coast?

The wake you leave
tells it all.
What is the legacy
that you bequeath?

Carey Paige

(by kind permission of Carey Paige)

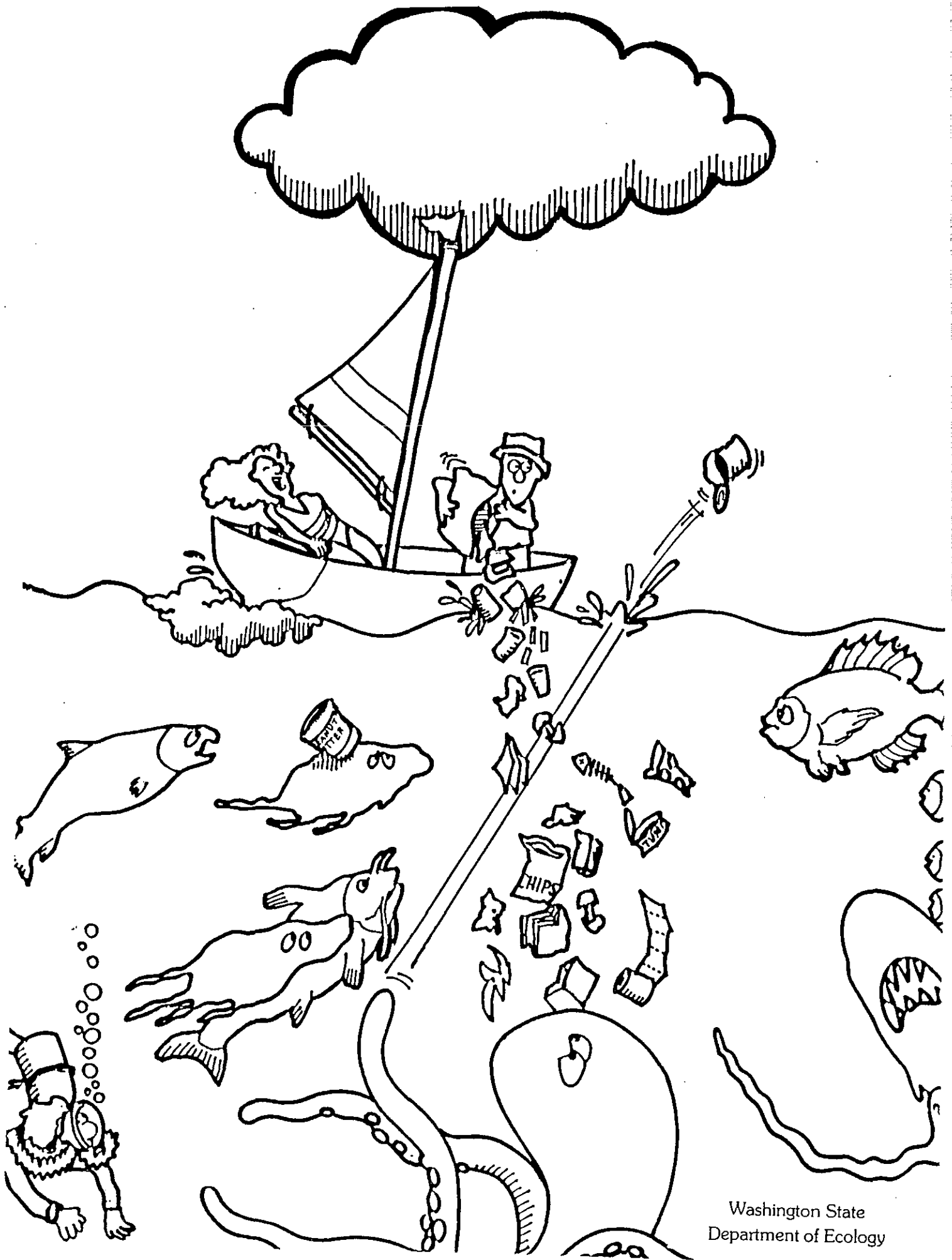


Anthony Taber
153 Enfield Main Road
Box A, Ithaca, NY 14850

(contact artist for full color picture
or poster)



**DON'T TEACH YOUR TRASH
TO SWIM!**



Washington State
Department of Ecology

APPENDIX 8: REFUSE HANDLING IDEAS

SUGGESTIONS FOR ON-BOARD REFUSE CONTAINMENT

(Made by Newport's Fishermen)

1. Establish a strong vessel policy that no plastic is to be tossed overboard. Remind crew occasionally of this policy and penalize non-compliance.
2. Make sure vessel is cleaned-up before leaving port. (That is refuse from demolition, repair, and provisioning is disposed of in port before heading out to sea).
3. Remove all excess packaging from the provisions and dispose of before leaving port.
4. If at sea for long periods of time and space is a serious limitation, separate plastic refuse from degradable refuse by having different but adjacent containers for the separation of these items (may be especially important in the galley).
5. Compactors allow a four or five to one reduction in refuse volume. The small bag of compacted refuse that results can be wrapped in a large plastic bag and stored alongside the wheel house or in the hold without smell problems. (SEARS has offered compactors at near cost to all ocean going vessels in the U.S., see ordering information below.)
6. Make sure there is a refuse container or method established for containing refuse at vessel work stations, especially if packaged bait is used. (Many fishermen stuff one plastic bait bag into another and keep compacting them down. They can then store the small volume of refuse on work deck or put it back down into the freezer. Some fishermen have mounted a tote or barrel on the back deck during some of their fisheries to store refuse and gear in).
7. A simple refuse container is a net bag which can be hung from any hook or railing, and can be devised from old net and stiff line or scrap metal. (See photograph of this bag in figure 3, p.9.)
8. Ask grocery stores to package vessel supplies in paper bags or cardboard boxes rather than plastic sacks.
9. Ask one's bait suppliers to use refillable bait buckets or trays or degradable packaging materials.
10. If time permits, as supplies are used, reorganize supply space to permit storage of dry plastic packaging materials.

TRASH COMPACTORS OFFERED AT LOW COSTS TO VESSELS!

The Sears corporation has offered all sea going vessels in the United States a special offer on their kitchen-sized Kenmore trash compactors (model number 13965). Compactors are offered at the near cost price of \$236. This compactor measures 34"h x 15"w x 24"d, weighs 170 pounds, and runs off 110 volts.

These compactors will allow between four and five kitchen sized bags of trash to be compacted into one small rectangular bag. Use of such compactors can facilitate the containment and storage of refuse on board, and may be most helpful to those vessels spending two or more weeks at sea.

This special offer is coordinated only through the Contract Sales Offices of Sears. Call information or contact your nearest Sears store to find out the location of the Contract Sales Office in the region. (Note: Sea Grant Extension Agents and industry groups should be encouraged to advertise this offer.)

To order a compactor call this Contract Sales Office to find out the shipping price to your community. The total cost for the compactor will be \$236 plus the shipping costs. Make sure to note the name of the vessel on which the compactor will be placed.

(If the contract sales office has questions, have them contact Dick Galante, National Contract Sales Appliance Sales Manager at Sears headquarters in Chicago (312-875-6907), or Larry Chimenti, Pacific North West Contract Sales Appliance Sales Manager of Sears in Seattle (800-732-1100).